Security Guide

Borland VisiBroker® 7.0

Borland®

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Chapter

1

Introduction to Borland VisiBroker

For the CORBA developer, Borland provides *VisiBroker for Java*, *VisiBroker for C++*, and *VisiBroker for .NET* to leverage the industry-leading VisiBroker Object Request Broker (ORB). These three facets of VisiBroker are implementations of the CORBA 2.6 specification.

VisiBroker Overview

VisiBroker is for distributed deployments that require CORBA to communicate between both Java and non-Java objects. It is available on a wide range of platforms (hardware, operating systems, compilers and JDKs). VisiBroker solves all the problems normally associated with distributed systems in a heterogeneous environment.

VisiBroker includes:

- VisiBroker for Java, VisiBroker for C++, and VisiBroker for .NET, three implementations of the industry-leading Object Request Broker.
- VisiNaming Service, a complete implementation of the Interoperable Naming Specification in version 1.3.
- GateKeeper, a proxy server for managing connections to CORBA Servers behind firewalls.
- VisiBroker Console, a GUI tool for easily managing a CORBA environment.
- Common Object Services such as VisiNotify (implementation of Notification Service Specification), VisiTransact (implementation of Transaction Service Specification), VisiTelcoLog (implementation of Telecom Logging Service Specification), VisiTime (implementation of Time Service Specification), and VisiSecure.

VisiBroker features

VisiBroker offers the following features:

- “Out-of-the-box” security and web connectivity.
- Seamless integration to the J2EE Platform, allowing CORBA clients direct access to EJBs.
- A robust Naming Service (VisiNaming), with caching, persistent storage, and replication for high availability.
- Automatic client failover to backup servers if primary server is unreachable.
- Load distribution across a cluster of CORBA servers.
- Full compliance with the OMG's CORBA 2.6 Specification.
- Integration with the Borland JBuilder integrated development environment.
- Enhanced integration with other Borland products including Borland AppServer.

VisiBroker Documentation

The VisiBroker documentation set includes the following:

- Borland *VisiBroker Installation Guide*—describes how to install VisiBroker on your network. It is written for system administrators who are familiar with Windows or UNIX operating systems.
- Borland *Security Guide*—describes Borland's framework for securing VisiBroker, including VisiSecure for VisiBroker for Java and VisiBroker for C++.
- Borland *VisiBroker for Java Developer's Guide*—describes how to develop VisiBroker applications in Java. It familiarizes you with configuration and management of the Visibroker ORB and how to use the programming tools. Also described is the IDL compiler, the Smart Agent, the Location, Naming and Event Services, the Object Activation Daemon (OAD), the Quality of Service (QoS), the Interface Repository, and the Interface Repository, and Web Service Support.
- Borland *VisiBroker for C++ Developer's Guide*—describes how to develop VisiBroker applications in C++. It familiarizes you with configuration and management of the Visibroker ORB and how to use the programming tools. Also described is the IDL compiler, the Smart Agent, the Location, Naming and Event Services, the OAD, the QoS, Pluggable Transport Interface, RT CORBA Extensions, and Web Service Support.
- Borland *VisiBroker for .NET Developer's Guide*—describes how to develop VisiBroker applications in a .NET environment.
- Borland *VisiBroker for C++ API Reference*—provides a description of the classes and interfaces supplied with VisiBroker for C++.
- Borland *VisiBroker VisiTime Guide*—describes Borland's implementation of the OMG Time Service specification.
- Borland *VisiBroker VisiNotify Guide*—describes Borland's implementation of the OMG Notification Service specification and how to use the major features of the notification messaging framework, in particular, the Quality of Service (QoS) properties, Filtering, and Publish/Subscribe Adapter (PSA).
- Borland *VisiBroker VisiTransact Guide*—describes Borland's implementation of the OMG Object Transaction Service specification and the Borland Integrated Transaction Service components.

- Borland *VisiBroker VisiTelcoLog Guide*—describes Borland's implementation of the OMG Telecom Log Service specification.
- Borland *VisiBroker GateKeeper Guide*—describes how to use the VisiBroker GateKeeper to enable VisiBroker clients to communicate with servers across networks, while still conforming to the security restrictions imposed by web browsers and firewalls.

The documentation is typically accessed through the Help Viewer installed with VisiBroker. You can choose to view help from the standalone Help Viewer or from within a VisiBroker Console. Both methods launch the Help Viewer in a separate window and give you access to the main Help Viewer toolbar for navigation and printing, as well as access to a navigation pane. The Help Viewer navigation pane includes a table of contents for all VisiBroker books and reference documentation, a thorough index, and a comprehensive search page.

Important Updates to the product documentation, as well as PDF versions, are available on the web at `http://www.borland.com/techpubs`.

Accessing VisiBroker online help topics in the standalone Help Viewer

To access the online help through the standalone Help Viewer on a machine where the product is installed, use one of the following methods:

Windows

- Choose Start|Programs|Borland Deployment Platform|Help Topics
- or, open the Command Prompt and go to the product installation `\bin` directory, then type the following command:

```
help
```

UNIX Open a command shell and go to the product installation `/bin` directory, then enter the command:

```
help
```

Tip During installation on UNIX systems, the default is to not include an entry for `bin` in your `PATH`. If you did not choose the custom install option and modify the default for `PATH` entry, and you do not have an entry for current directory in your `PATH`, use `./help` to start the help viewer.

Accessing VisiBroker online help topics from within the VisiBroker Console

To access the online help from within the VisiBroker Console, choose Help|Help Topics.

The Help menu also contains shortcuts to specific documents within the online help. When you select one of these shortcuts, the Help Topics viewer is launched and the item selected from the Help menu is displayed.

Documentation conventions

The documentation for VisiBroker uses the typefaces and symbols described below to indicate special text:

Table 1.1 Documentation conventions

Convention	Used for
italics	Used for new terms and book titles.
`computer`	Information that the user or application provides, sample command lines and code.
bold computer	In text, bold indicates information the user types in. In code samples, bold highlights important statements.
[ ]	Optional items.
...	Previous argument that can be repeated.
|	Two mutually exclusive choices.

Platform conventions

The VisiBroker documentation uses the following symbols to indicate platform-specific information:

Table 1.2 Platform conventions

Symbol	Indicates
Windows	All supported Windows platforms.
Win2003	Windows 2003 only
WinXP	Windows XP only
Win2000	Windows 2000 only
UNIX	UNIX platforms
Solaris	Solaris only
Linux	Linux only

Contacting Borland support

Borland offers a variety of support options. These include free services on the Internet where you can search our extensive information base and connect with other users of Borland products. In addition, you can choose from several categories of telephone support, ranging from support on installation of Borland products to fee-based, consultant-level support and detailed assistance.

For more information about Borland's support services or contacting Borland Technical Support, please see our web site at: `http://support.borland.com` and select your geographic region.

When contacting Borland's support, be prepared to provide the following information:

- Name
- Company and site ID
- Telephone number
- Your Access ID number (U.S.A. only)
- Operating system and version
- Borland product name and version
- Any patches or service packs applied

- Client language and version (if applicable)
- Database and version (if applicable)
- Detailed description and history of the problem
- Any log files which indicate the problem
- Details of any error messages or exceptions raised

Online resources

You can get information from any of these online sources:

World Wide Web `http://www.borland.com`

Online Support `http://support.borland.com` (access ID required)

Listserv To subscribe to electronic newsletters, use the online form at:

`http://www.borland.com/products/newsletters`

World Wide Web

Check `http://www.borland.com/bes` regularly. The VisiBroker Product Team posts white papers, competitive analyses, answers to FAQs, sample applications, updated software, updated documentation, and information about new and existing products.

You may want to check these URLs in particular:

- `http://www.borland.com/products/downloads/download_visibroker.html` (updated VisiBroker software and other files)
- `http://www.borland.com/techpubs` (documentation updates and PDFs)
- `http://info.borland.com/devsupport/bdp/faq/` (VisiBroker FAQs)
- `http://community.borland.com` (contains our web-based news magazine for developers)

Borland newsgroups

You can participate in many threaded discussion groups devoted to the Borland VisiBroker. Visit `http://www.borland.com/newsgroups` for information about joining user-supported newsgroups for VisiBroker and other Borland products.

Note These newsgroups are maintained by users and are not official Borland sites.

Chapter

2

Getting Started with Security

As more businesses deploy distributed applications and conduct operations over the Internet, the need for high quality application security has grown.

Sensitive information routinely passes over Internet connections between web browsers and commercial web servers; credit card numbers and bank balances are two examples. For example, users engaging in commerce with a bank over the Internet must be confident that:

- They are in fact communicating with their bank's server, not an impostor that mimics the bank for illegal purposes.
- The data exchanged with the bank will be unintelligible to network eavesdroppers.
- The data exchanged with the bank software will arrive unaltered. An instruction to pay $500 on a bill must not accidentally or maliciously become $5000.

VisiSecure lets the client authenticate the bank's server. The bank's server can also take advantage of the secure connection to authenticate the client. In a traditional application, once the connection has been established, the client sends the user's name and password to authenticate. This technique can still be used once a VisiSecure connection has been established, with the additional benefit that the user name and password exchanges will be encrypted. VisiSecure provides support for any number of authentication realms providing access to portions of distributed applications. In addition, with VisiSecure you can create authorization domains that delineate access-control rules for your applications.

VisiSecure overview

VisiSecure provides a framework for securing VisiBroker and BDOC. VisiSecure lets you establish secure connections between clients and servers.

VisiSecure for Java

VisiSecure is 100% Java and supports all security requirements of the J2EE 1.3 specification. VisiSecure uses the Java Authentication and Authorization System (JAAS) for authentication, the Java Secure Socket Extension (JSSE) for SSL communications, and the Java Cryptography Extension (JCE) for cryptographic operations. Most of the APIs for Java applications reflect the existing JDK or additional Java standard APIs. Care has been taken not to duplicate APIs at the different security layers. In some cases, VisiSecure feature set exceeds the J2EE 1.3 security requirements.

VisiSecure for C++

VisiSecure for C++ offers similar feature as VisiSecure for Java. See Chapter 11, “VisiSecure for C++ APIs” and Chapter 10, “Security Properties for C++” for detailed information.

Pluggability

VisiSecure allows many security technologies to be plugged in. Pluggability is provided at various levels. Security service providers can plug in and replace the entire set of security services and application developers can plug in smaller modules to achieve custom integration with their environment. The only layers which are not pluggable are the CSIv2 layer and the transport layer which are tightly integrated with the internal implementation of the VisiBroker ORB and interact heavily with each other.

VisiSecure design flexibility

Borland has designed VisiSecure to work with a variety of application architectures, so that it can support many different current and future architectures. However, while VisiSecure represents a powerful security architecture, alone it cannot fully protect your servers. You must be responsible for physical security, and configuring you base web server (host) and operating system services in the most secure manner possible.

VisiSecure for Java features

VisiSecure has the following features:

- **Enterprise Java Beans (EJB) Container Integration:** VisiSecure seamlessly integrates EJB security mechanisms with the underlying CORBA Security Service and CSIv2. CORBA offers enhanced features to the security architecture of your bean. By utilizing VisiSecure, you have additional options over the relatively simple EJB security model.

- **Web Container Integration:** VisiSecure integrates with the web container by providing mechanisms to the web container that allow its own authentication and authorization engines to propagate security information to other EJB containers, as necessary. For example, a servlet trying to invoke an EJB container's bean will act on behalf of the original browser client that triggered the initial request. Security information supplied from the client will be propagated seamlessly to the EJB container. In addition, the web container authentication and authorization engine can be configured to use authentication LoginModules and authorization rolemaps supplied by Borland.
- **Security Services Administrator:** The administration and configuration of VisiSecure is performed using simple-to-use properties and supports tools like the Java keytool.
- **GateKeeper:** You can use GateKeeper to enable authenticated connections across a high-level firewall. This allows clients to connect to the server, even if the server and the application client are on opposite sides of a firewall. Use of the GateKeeper is fully documented in the *VisiBroker GateKeeper Guide*.
- **Secure Transport Layer:** VisiSecure utilizes SSL, the primary secure transport level communication protocol on the Internet, as a secure transport layer. SSL provides message confidentiality, message integrity, and certificate-based authentication support through a trust model.

VisiSecure for C++ Features

VisiSecure for C++ has the following features:

- **Authentication and Authorization**: The Authentication and Authorization model are similar to VisiSecure for Java. This extends the capability of VisiSecure for C++ applications.
- **Security Services Administrator**: The administration and configuration of VisiSecure is performed using simple-to-use properties.
- **Secure Transport Layer**: VisiSecure utilizes SSL, the primary secure transport-level communication protocol on the Internet, as a secure transport layer. SSL provides message confidentiality, message integrity, and certificate-based authentication support through a trust model.

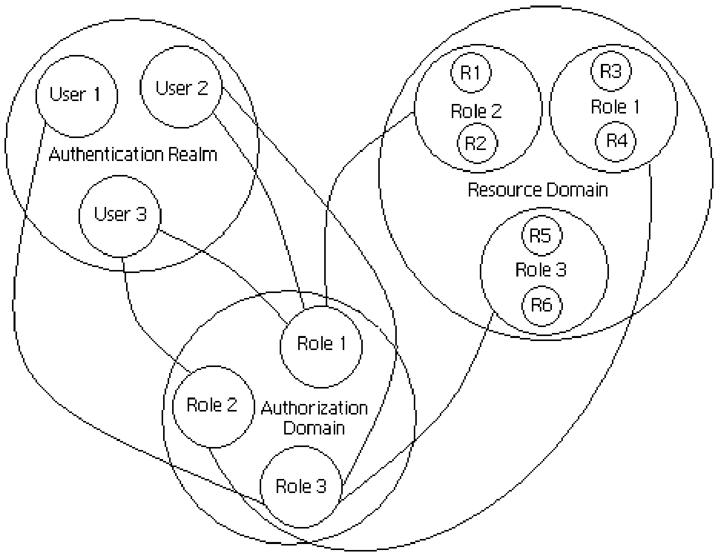
Basic security model

The basic security model describes VisiSecure and its components from a user's perspective. This is the logical model that VisiSecure users need to understand, configure and interact with. The security service groups entities of a system into the following three logical groups (domains):

- **Authentication realm (User domain):** simply a database of users. Each authentication realm describes a set of users and their associated credentials and Privileges attributes.
- **Resource Domain:** represents a collection of resources of a single application. The application developer defines the access control policies for access to resources in the application.
- **Authorization Domain:** defines the set of rules that determines whether an access attempt to a particular resource is allowed.

The following figure displays the relationship among these domains.

Figure 2.1 Interaction Among Different Domains in VisiSecure



These three VisiSecure domains are closely related.

1 For authentication, you need an authentication realm. VisiBroker comes with a simple one, or you can use an existing supported realm, like an LDAP server.

2 For authorization, you need to set up roles, and associate users with those roles.

3 Then, you need to set up a resource domain, and grant access to the resources in that domain to certain roles.

Authentication realm (user domain)

An authentication realm, simply described, is a database of users. Each authentication realm describes a set of users and their associated credentials and privileges, such as the user's password and the groups to which the user belongs, respectively. Examples of authentication realms are: an NT domain, an NIS or yp database, or an LDAP server.

An authentication realm is defined both by the authentication technology it uses, as well as a set of configuration options that point to the source of the data. For example, if you are using LDAP, then the authentication realm specifies LDAP as the authentication protocol, specifies the name of the server, and specifies other configuration parameters. When you log on to a system, the system is authenticating you. For more information, see Chapter 3, “Authentication.”

Resource domain

A *resource* defines an application component that VisiSecure needs to protect. VisiSecure organizes resources into *resource domains* containing every resource in an application. This means every remote method or servlet that is exposed by a server is essentially a resource.

The application developer defines access control policies for access to resources in the application. These are defined in terms of roles. *Roles* provide a logical collection of permissions to access a set of resources. For more information, see Chapter 4, “Authorization.”

In addition, applications may choose to be more security aware and provide access control for more fine grained resources such as fields, or access to external resources such as databases. The EJB and Servlet specifications provide standard deployment descriptor information that allow applications to define their access policies in terms of the set of roles required to access a given method.

Authorization domain

The authorization domain allows users to act in given roles. VisiSecure grants privileges to access resources based on these roles. When VisiBroker applications pass user identities from one application to another, the identity contains user information, and the permissions based on the specified roles. The caller's identity is then matched with the required rules to determine whether the caller satisfies the required rules. If the caller satisfies the rules, access is granted. Otherwise, access is denied. For more information, see Chapter 4, “Authorization.”

Distributed environments and VisiSecure SPI

For a distributed environment, in addition to the three domains that make up the basic security model, the following must be considered:

- Distributed transmission of the authorization privileges
- Assertion and trusting assertion

The VisiSecure Service Provider Interface (SPI) provides interfaces and classes to address secure transportation, assertion, and assertion trust. The transmission (or interoperability) is handled by the underlying CSIv2 implementation. Because the implementation of the SPI is closely bundled with the VisiBroker ORB, it cannot be separated from the core as a generic SPI for other languages.

Specifically, the VisiSecure SPI classes enable customization of your Security Service in the following:

- Identification and Authentication
- Authorization (or access control decision making)
- Assertion trust

Managing authentication and authorization with JAAS

The Java Authentication and Authorization Service (JAAS) defines extensions that allow pluggable *authorization* and user-based *authentication*. This framework effectively separates the implementation of authentication from authorization, allowing greater flexibility and broader vendor support. The fine-grained access control capabilities allow application developers to control access to critical resources at the granularity level that makes the most sense.

Authentication and Identification

Authentication is the process of verifying that an entity (human user, service, or component, and such) is the one it claims to be. The authentication process includes:

1. acquiring credentials from the to-be-authenticated entity,
2. then verifying the credentials.

VisiSecure employs the JAAS framework to facilitate the interaction between the entities and the system.

System identification

Any system first needs to identify itself before being allowed access to resources. Client identification is always required for resource access. In a CORBA/J2EE environment, the need for identification also exists for servers as well. Servers need identification in two cases:

- One, when using SSL for transport layer security, the server typically needs to identify itself to the client.
- Two, when mid-tier servers make further invocations to other mid-tier or end-tier servers, they need to identify themselves before being allowed (potentially) to act on behalf of the original caller.

For more information, see "System Identification" on page 36.

Authentication and pluggability

Authentication in VisiBroker is a JAAS implementation allowing pluggable authentication. The JAAS logon service separates the configuration from implementation. A low-level system programming interface called the LoginModule, provides an anchor point for pluggable security modules.

At the same time as system identification, the *authentication mechanism* concept is employed to represent the "format" for communicating (or transporting) authentication information between various components of the security subsystem. The security service provider for the authentication/identification process implements the specific format (encoding and decoding process) that is to be used by the underlying core system.

In a distributed environment, the authentication process is further complicated by the fact that the representation of the entity and the corresponding credential must be transported among peers in a generic fashion. Therefore, the VisiSecure Java SPI employs the concept of the `AuthenticationMechanism` and defines a set of classes for doing authentication/identification in a distributed environment.

Server and/or client authentication

With the VisiBroker implementation of JAAS, you can set different mechanisms of authentication. You can have server authentication, where servers are authenticated by clients using public-key certificates. You can also have client authentication. Clients can be authenticated using passwords or public-key certificates. That is, the server can be configured to authenticate clients with a password or clients with public-key certificates.

Authenticating clients with usernames and passwords

If server-side authentication is not required, authentication can be accomplished using a standard username/password combination. To authenticate clients using usernames and passwords, several things need to happen. The server should expose a set of realms to which it can authenticate a client. Each realm should correspond to a JAAS LoginModule that actually does the authentication. Finally, the client should provide a username and password, and a realm under which it wishes to authenticate itself. For more information, see Chapter 3, "Authentication."

Authentication property settings

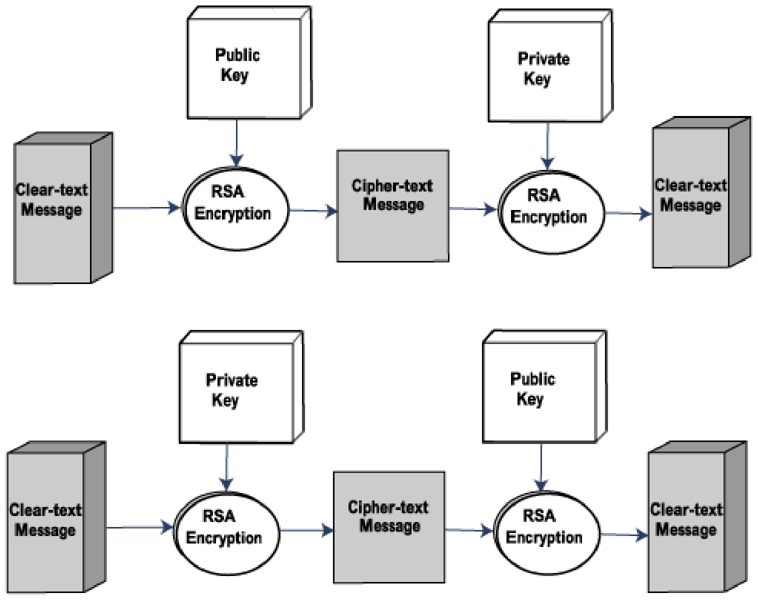
The authentication policy—whether it is server or client authentication and whether it is done using public-key certificates or passwords—is determined by property settings. For more information, see Chapter 10, “Security Properties for C++” and Chapter 9, “Security Properties for Java.”

Public-key encryption

In addition to username/password-based authentication, VisiSecure also supports *public-key encryption*. In public-key encryption, each user holds two keys: a *public key* and a *private key*. A user makes the public key widely available, but keeps the private key secret.

Data that has not been encrypted is often referred to as *clear-text*, while data that has been encrypted is called *cipher-text*. When a public key and a private key are used with the public-key encryption algorithm, they perform inverse functions of one another, as shown in the following diagram.

- In the first case, the public key is used to encrypt a clear-text message into a cipher-text message; the private key is used to decrypt the resulting cipher-text message.
- In the second case, the private key is used to encrypt a message (typically in the case of digital signatures—that is, “signed” messages), while the public key is used to decrypt it.



If someone wants to send you sensitive data, they acquire your public key and use it to encrypt that data. Once encrypted, the data can only be decrypted with the private key. Not even the sender of the data will be able to decrypt the data. Note that encryption can be *asymmetric* or *symmetric*.

Asymmetric encryption

Asymmetric encryptions has both a public and a private key. Both keys are linked together such that you can encrypt with the public key but can only decrypt with the private key, and vice-versa. This is the most secure form of encryption.

Symmetric encryption

Symmetric encryption uses only one key for both encryption and decryption. Although faster than asymmetric encryption, is requires an already secure channel to exchange the keys, and allows only a single communication.

Certificates and Certificate Authority

When you distribute your public key, the recipients of that key need some sort of assurance that you are indeed who you claim to be. The *ISO X.509 standard* defines a mechanism called a *certificate*, which contains a user's public key that has been digitally signed by a trusted entity called a *Certificate Authority* (CA). When a client application receives a certificate from a server, or vice-versa, the CA that issued the certificate can be used to verify that it did indeed issue the certificate. The CA acts like a notary and a certificate is like a notarized document.

You obtain a certificate by constructing a certificate request and sending it to a CA.

Digital signatures

Digital signatures are similar to handwritten signatures in terms of their purpose; they identify a unique author. Digital signatures can be created through a variety of methods. Currently, one of the more popular methods involves an encrypted hash of data.

1. The sender produces a one-way hash of the data to be sent.
2. The sender digitally signs the data by encrypting the hash with a private key.
3. The sender sends the encrypted hash and the original data to the recipient.
4. The recipient decrypts the encrypted hash using the sender's public key.
5. The recipient produces a one-way hash of the data using the same hashing algorithm as the sender.
6. If the original hash and the derived hash are identical, the digital signature is valid, implying that the document is unchanged and the signature was created by the owner of the public key.

Generating a private key and certificate request

To obtain a certificate to use in your application, you need to first generate a private key and certificate request. To automate this process, for Java applications you can use the Java keytool, or for C++ applications you can use open source tools like `OpenSSL` utility.

After you generate the files, you should submit the certificate request to a CA. The procedure for submitting your certificate request to a CA is determined by the certificate authority which you are using. If you are using a CA that is internal to your organization, contact your system administrator for instructions. If you are using a commercial CA, you should contact them for instructions on submitting your certificate request. The certificate request you send to the CA will contain your public key and your distinguished name.

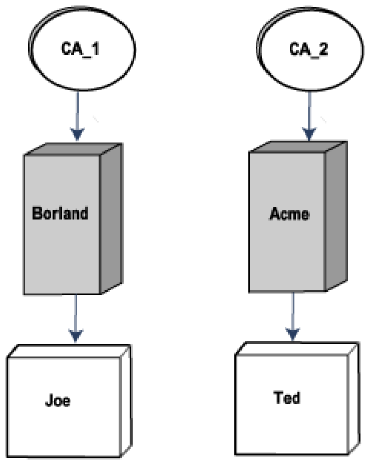
Distinguished names

A *distinguished name* represents the name of a user or the CA that issued the user's certificate. When you submit a certificate request, it includes a distinguished name for the user that is made up of the components listed in the following table.

Tag	Description	Required Component
Common-Name	The name to be associated with the user.	Yes
Organization	The name of the user's company or organization.	Yes
Country	The two character country code that identifies the user's location.	Yes
Email	The person to contact for more information about this user.	No
Phone	The user's phone number.	No
Organizational Unit	The user's department name.	No
Locality	The city in which the user resides.	No

Certificate chains

The ISO X.509 standard provides a mechanism for peers who wish to communicate, but whose certificates were issued by different certificate authorities. Consider the following figure, in which Joe and Ted have certificates issued by different CAs.



For Joe to verify the validity of Ted's certificate, he must inspect each CA in the chain until a trusted CA is found. If a trusted CA is not found, it is the responsibility of the server to choose whether to accept or reject the connection. In the case shown in the preceding figure, Joe would follow these steps:

1. Joe obtains Ted's certificate and determines the issuing CA, `Acme`.
2. Since the `Acme` CA is not in Joe's certificate chain, Joe obtains the issuer of the certificate for `CA_2`.
3. Because `CA_2` is not a trusted CA, the server decides whether to accept or reject the connection.

Note The manner in which you obtain certificate information from a CA is defined by that CA.

Certificate authentication

Closely associated with authentication is the concept of trust. For practical purposes, trust operates just like authentication. Trust can be applied at the transport level if a certificate identity is presented, or at even higher levels (at the CSIv2 layer) where the identity takes the form of a username/password.

Java For trusting certificates with Java code, VisiSecure provides mechanisms to support user-provided JSSE `X509TrustManager` that indicates whether a given certificate chain is trusted. You can also specify a Java keystore where certificate entries are trusted using standard Java properties.

C++ For VisiBroker for C++ users, the a set of APIs that allow trustpoints (trusted certificates) to be configured is provided as well. For more information, see Chapter 11, "VisiSecure for C++ APIs."

Certificate Revocation List (CRL) and revoked certificate serial numbers

C++ Only When signed public key certificates are created by a Certificate Authority (CA), each certificate has an expiration date that indicates when it is no longer valid. However, in order to address the case where a certificate becomes invalid for some reason before the date of expiration, the Certificate Revocation List (CRL) feature is provided for VisiSecure for C++. For more information about Certificate Authorities (CA)s, see the "Certificates and Certificate Authority" on page 14.

Using the VisiSecure for C++ Certificate Revocation List (CRL) feature, you can set up CRLs and check peer certificates against this list during SSL handshake communication.

The CRL files must be in `DER` format and are stored in a directory. To input a CRL into VisiSecure for C++, you need to set the `vbroker.security.CRLRepository` property to the directory where the CRL files reside. For more information on VisiSecure for C++ properties, see Chapter 10, "Security Properties for C++."

Note There can be more than one CRL file within the CRL Repository directory structure.

Once the CRLs are loaded, VisiSecure examines all certificates sent by a peer during SSL handshake. If any of the peer certificates appears in the CRLs, an exception will be thrown and the connection will be refused.

Negotiating Quality of Protection (QoP) parameters

When clients and servers communicate, they both need to agree on some parameters for the Quality of Protection (QoP) that will be provided. The resource host (the server) will:

- publish all the QoP parameters that it can support, and
- impose a set of required QoP parameters on the clients.

Note By definition, a required QoP is also a supported QoP.

For example, a server may support and require secure transport (SSL) while it may support authentication but not require it. This is useful, for example, in the case where some resources are not sensitive and anonymous access is acceptable. For more information about QoP and QoS parameters:

C++ See "QoP API" on page 113.

Java See `com.borland.security.csiv2` and Chapter 9, "Security Properties for Java."

Secure Transportation

VisiSecure functions in two transport environments:

- using IIOP over plain sockets
- using secure sockets (SSL)

In intranet scenarios, it may be safe to transfer information (including sensitive data, such as user authentication credentials) using IIOP over plain sockets. However, when the network environment is not trusted (such as the Internet, or even an intranet), you need to guarantee integrity (the message was not modified or tampered with during transmission) and confidentiality (the message cannot be read by anybody even if they intercepted it during transmission) of messages being transmitted over the network. This is achieved by using secure sockets (SSL).

JSSE and SSL pluggability

Java VisiSecure uses Java Secure Sockets Extension (JSSE) to perform SSL communication. VisiSecure SPI Secure Socket Provider class provides access to the underline SSL implementation. Any appropriate implementation following Java Secure Socket Extension (JSSE) framework can be easily plugged in independent of other provider mechanisms. The only necessary step is mapping the interfaces (or, in another word, callback methods) defined to the corresponding JSSE implementation. For more information on the SPI Secure Socket Provider class, see VisiSecure SPI for Java and Chapter 12, “Security SPI for C++.”

For the “out-of-box” installation of VisiBroker, the JSSE implementation provided by Java SDK is used.

Setting the level of encryption

The SSL product uses a number of encryption mechanisms. These mechanisms are industry-standard combinations of authentication, privacy, and message integrity algorithms. This combination of characteristics is referred to as a *cipher suite*.

The client and server have a static list of supported cipher suites. This list is used during the handshake phase of the connection to determine which cipher suite will be used. The client sends a list of all cipher suites it knows to the server. The server then takes this information and determines which cipher suites both the server and client understand. By default, the server selects the strongest available cipher suite.

While this cipher suite order ensures strong security, you may want to adopt a different cipher suite order based on application-specific security requirements. When you want to change the order of the cipher suites, use the Quality of Protection (QoP) API function calls; you can retrieve a list of the currently available cipher suites, then set the list to a new order so weaker cipher suites are used before stronger cipher suites.

Note You cannot add new cipher suites. You can modify only the order of the cipher suites that are available and remove cipher suites you do not want to use.

Supported cipher suites

A *cipher suite* is a set of valid encoding algorithms used to encrypt data. Cipher suites have different security levels and can serve different purposes. For example, some ciphers provide for authentication while others do not; some provide for encryption and others do not. Segments of the name of the cipher indicate what the cipher suite does or does not provide.

The following table shows the cipher name segments and what these segments mean.

Cipher name	Description
RC4 (through RC8)	Symmetric encryption used in the cipher
MD5	Data integrity mechanism.
	Data is sent clear, but a hash code is used at the receiving end to ensure data integrity.
SHA	Data integrity mechanism
WITH	Authentication with encryption
ANON	Uses DLT, an anonymous key exchange algorithm
NULL	No encryption
EXPORT	Public key size is limited.
	Note: The larger the size of a public/private key, the more secure that key is. This option is typically used for international (outside the United States) users.
EXPORT1024	The maximum key size is limited to 1024 bytes.

The list of supported ciphers for VisiSecure for Java, is determined by the JSSE package used. As for VisiSecure for C++, the list can be located at `csstring.h` file bundled with the installation.

Authorization

Authorization occurs after the user proves who he or she is (Authentication). Authorization is the process of making access control decisions on requested resources for an authenticated entity based on certain security attributes or privileges. Following Java Security Architecture, VisiBroker adopts the notion of *permission* in authorization. In VisiSecure, resource authorization decisions are based on permissions. Borland uses a proprietary authorization framework based on users and roles to accomplish authorization. For example, when a client accesses a CORBA or Web request enterprise bean method, the application server must verify that the user of the client has the authority to perform such an access. This process is called access control or authorization.

Access Control List

Authorization is based on the user's identity and an *access control list* (ACL), which is a list roles. Typically, an access control list specifies a set of roles that can use a particular resource. It also designates the set of people whose attributes match those of particular roles, and thus are allowed to perform those roles.

Roles-based access control

VisiSecure uses an access control scheme based on roles. The deployment descriptor maintains a list of roles that are authorized to access each enterprise bean method. VisiSecure uses a role database (a file whose default name is `roles.db`) to do the association between user identities and EJB roles. If a user is associated with at least one role, the user may access the method. For more information, see Chapter 4, “Authorization.”

Pluggable Authorization

VisiSecure provides the ability to plug-in an authorization service that can map users to roles. The implementer of the Authorization Service provides the collection of permission objects granted access to certain resources. A new class, `RolePermission` is defined to represent "role" as permission. The Authorization Services Provider in turn provides the implementation on the homogeneous collection of `RolePermissions` contained for an association between given privileges and a particular resource.

The Authorization Service is tightly connected with the concept of Authorization domain—each domain has exactly one Authorization Services Provider implementation. The Authorization domain is the bridge between VisiSecure system and the authorization service implementation. During the initialization of the ORB itself, the authorization domains defined by the property `vbroker.security.authDomains` are constructed, while the Authorization Services Provider implementation is instantiated during the construction of the Authorization domain itself.

The Authorization Domain defines the set of rules that determine whether a user belongs to a logical "role" or not.

For more information, see Chapter 4, "Authorization."

Context Propagation

In addition to ensuring the confidentiality and integrity of transmitted messages, you need to communicate caller identity and authentication information between clients and servers. This is called *delegation*. The caller identity also needs to be maintained in the presence of multiple tiers in an invocation path. This is because a single call to a mid-tier system may result in further calls being invoked on other systems which must be executed based on the privileges attributed to the original caller.

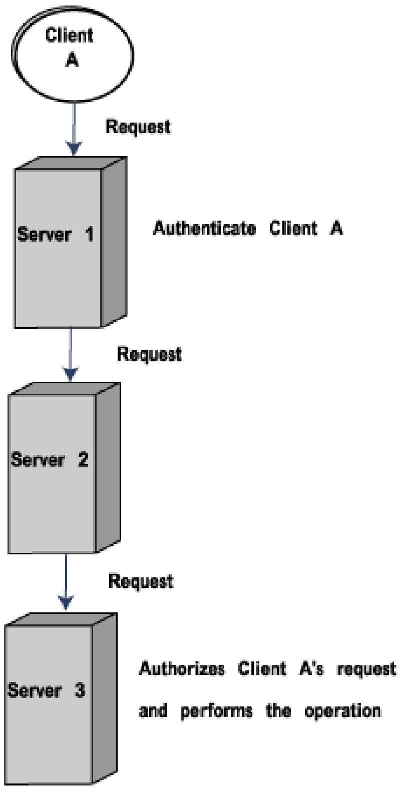
In a distributed environment, it is common for a mid-tier server to make *identity assertions* and act on behalf of the caller. The end-tier server must make decision on whether the assertion is trusted or not. When propagating context, the client transfers the following information:

- **Authentication token**—client's identity and authentication credentials.
- **Identity token**—any *identity assertion* made by this client.
- **Authorization elements**—privilege information that a client may push about the caller and/or itself.

Identity assertions

Identity assertion occurs when several servers with secure components are involved in a client request. At times, it is necessary for a server to act on behalf of its clients—when a client request is passed from one server to another. This is typical in the case where a client calls a mid-tier server, and the server further needs to call an end-tier server to perform a part of the service requested by the client. At such times, the mid-tier server typically needs to act on behalf of the client. In other words, it needs to let the end-tier server know that while it (the mid-tier server) is communicating with the end-tier server, access control decisions must be based on the original caller's privileges and not its privileges.

For example, a client request goes to Server 1, and Server 1 performs the authentication of the identity of the client. However, Server 1 passes the client request to Server 2, which may in turn pass the request to Server 3, and so forth. See the following diagram:



Each subsequent server (Server 2 and Server 3) can assume that the client identity has been verified by Server 1 and thus the identity is trusted. The server that ultimately fulfills the client request, such as Server 3, need only perform the access control authorization.

By default the identity is authenticated only at the first tier server and is asserted. It is the asserted identity that propagates to other tiers.

Impersonation

Impersonation is the form of identity assertion where there is no restriction on what resources the mid-tier server can access on the end-tier server. The mid-tier server can perform any task on behalf of the client.

Delegation

The inverse of impersonation, *delegation* is the form of identity assertion where the client explicitly delegates certain privileges to the server. In this case, the server is allowed to perform only certain actions as dictated by the client. VisiSecure performs only simple delegation.

Trusting Assertions

A server (end-tier) may choose to accept or not accept identity assertions. In the case where it chooses to accept identity assertions, there are trust issues that present themselves. While the server may know that the peer is authentic, it must also confirm that the peer has the privilege to assert another caller or act on behalf of the caller. Since the caller itself is not authenticated by the end-tier, and the end-tier accepts the mid-tier's assertion, the end-tier needs to ensure that it trusts the mid-tier to have performed proper authentication of the original caller. It, in turn, trusts the mid-tier's trust in the authenticity of the caller.

There may be many peers to an end-tier system, some who are trusted as mid-tiers, and some that are just clients. Therefore, the privilege to speak for other callers must be granted only to certain peers.

Trust assertions and plug-ins

When a remote peer (server or process) makes identity assertions while acting on behalf of the callers, the end-tier server needs to trust the peer to make such assertions. The Security Provider Interface (SPI) allows you to plug in a Trust Services Provider to determine whether the assertion is allowed (trusted) for a given caller and a given set of privileges for the asserter. Specifically, you use the `TrustProvider` class to implement trust rules that determine whether the server will accept identity assertions from a given asserting subject. For more information, see sec-api-doc in the Help sytem, and the Chapter 12, "Security SPI for C++."

Backward trust

Backward trust is provided "out of the box", and is the form of trust where the server has rules to decide who it trusts to perform assertions. With backward trust, the client has no say whether the mid-tier server has the privilege to act on its behalf.

Forward trust

Forward trust is similar to delegation in that the client explicitly provides certain mid-tier servers the privilege to act on its behalf.

Temporary privileges

At times, a server needs to access a privileged resource to perform a service for a client. However, the client itself may not have access to that privileged resource. Typically, in the context of an invocation, access to all resources are evaluated based on the original caller's identity. Therefore, it would not be possible to allow this scenario, as the original caller does not have access to such privileged resource. To support this scenario, the application may choose to assume an identity different from that of the caller, temporarily while performing that service. Usually, this identity is described as a *logical role*, as the application effective requires to assume an identity that has access to all resources that require the user to be in that role.

Using IIOP/HTTPS

You can make use of HTTPS, featured in most browsers. The following guidelines should be followed:

- The VisiBroker proxy server GateKeeper must be running with SSL enabled on the exterior.
- An applet that only uses IIOP/HTTPS requires no pre installation of software (either classes or native libraries) on the client as long as the browser or applet viewer is HTTPS enabled.
- An applet using IIOP/HTTPS cannot use the `X509Certificate[]` class to set or examine identities. All certificate and private key administration is handled by the browser. Furthermore, when the `ORBalwaysTunnel` parameter in the applet tag is set to `true`, the ORB cannot resolve `SSLCurrent` objects.
- To enable an applet to use only IIOP/HTTPS, set `ORBalwaysTunnel` to `true` in the HTML page. If `ORBalwaysTunnel` is set to `false` (or unspecified) the ORB first tries to use IIOP/SSL, which requires the SSL classes and native SSL library to be installed locally.
- In general, IIOP/HTTPS is not available to Java applications because HTTPS is not supported by the JDK. However, there are no restrictions in VisiBroker for Java that prevent the addition of HTTPS support to the JDK and the use of IIOP/HTTPS in Java applications.

Netscape Communicator/Navigator

You can freely use Netscape Communicator with IIOP/HTTPS, however, some versions of Navigator require the installation of the CA certificate before allowing an IIOP/HTTPS connection. Follow these guidelines to use IIOP/HTTPS with Netscape Navigator:

- Make sure your server certificates are issued by a CA already trusted by Navigator.
- Install the root certificate into Navigator as a trusted certificate. Opening a certificate file (for example, cacert.crt in bank_https) gives you the opportunity to install the certificate.
- Use the GateKeeper to download the root certificate to the browser. The bank_https example shows how to do this.
- Commercial CAs usually provide a link that allows you to install their root certificate.
- GateKeeper, by default, does not ask for the client identity. You can enable this function by setting ssl_request_client_certificate to true in the GateKeeper configuration file.

Microsoft Internet Explorer

To use IIOP/HTTPS with Microsoft Internet Explorer, you must make sure that the HTTPS connection requires no user interaction. For example, if the browser visits a HTTPS site with an untrusted root certificate, the browser will ask for permission before establishing an HTTPS connection. The Microsoft JVM, due to a known bug, fails on this connection.

Here are several examples that illustrate this condition and ways in which you can work:

- Internet Explorer ships with a list of trusted Network Server Certificates Authority. If your server certificate is not issued by one of the trusted CAs, (the certificates shipped with bank_https, for example) IE asks for permission before establishing an HTTPS connection. The IIOP/HTTPS operation fails because the Microsoft JVM does not seem to support an HTTPS connection that requires user interaction. There are a number of ways to handle this situation:
  - Make sure your server certificates are issued by a CA already trusted by Internet Explorer.
  - Install the root certificate into IE as a trusted Network Server certificate. Opening a certificate file (for example, cacert.crt in bank_https) gives you the opportunity to install the certificate.
  - Use the GateKeeper to download the root certificate to the browser. The bank_https example shows how to do this.
  - Commercial CAs usually provide a link that allows you to install their root certificate.
- GateKeeper, by default, does not ask for the client identity. Although, you can enable this function by setting ssl_request_client_certificate=true in the GateKeeper configuration file, you cannot use IIOP/HTTPS because the browser asks for permission before responding with the user's credentials.

Internet Explorer optionally requires the Common Name field within the server certificate to be the same as the host name of the server. From the View|Internet Options menu, select the Advanced tab and scroll to the Security section. Make sure the box next to Warn about invalid site certificates is not checked to use a server certificate that does not contain the host name of the server.

Chapter

3

Authentication

The first layer of security protection for any system is authentication (as well as identity representation). This layer defines the process of verifying the entities are who they claim to be. Most of the time, credentials are required to verify the identity of an entity.

VisiSecure employs the Java Authentication and Authorization Service (JAAS) framework to facilitate the interaction between the entities and the system. At the same time, the *authentication mechanism* concept is employed to represent the *format* (encoding and decoding process) for communicating or transporting authentication information between various components of the security subsystem.

JAAS basic concepts

The Borland Security Service (BSS) employs the Java Authentication and Authorization Service (JAAS) framework to facilitate the interaction between the entities and the system. Those who are new to the JAAS should familiarize themselves with the terms JAAS uses for its services. Of particular importance are the concepts of *subjects*, *principals*, and *credentials*.

Subjects

JAAS uses the term *subject* to refer to any user of a computing service or resource. Another computing service or resource, therefore, is also considered a subject when it requests another service or resource. The requested service or resource relies on names in order to authenticate a subject. However, different services may require different names in order to use them.

For example, your email account may use one username/password combination, but your ISP requires a different combination. However, each service is authenticating the same subject—;namely yourself. In other words, a single subject may have multiple names associated with it. Unlike the example situation, in which the subject himself must know a set of usernames, passwords, or other authentication mechanisms at a specific time, JAAS is able to associate different names with a single subject and retain that information. Each of these names is known as a *principal*.

Principals

A *principal* represents any name associated with a subject. A subject could have multiple names, potentially one for each different service it needs to access. A subject, therefore, comprises a set of principals, such as in the code sample below:

Java
```
public interface Principal {
   public String getName();
}
public final class Subject {
   public Set getPrincipals()
}
```

C++
```
class Principal {
    public:
       std::string getName() const=0;}
class Subject {
    public:
    Principal::set& getPrincipals();
}
```

Principals populate the subject when the subject successfully authenticates to a service. You do not have to rely on public keys and/or certificates if your operational environment has no need for such robust technologies.

To return the principle name(s) for a subject from the application context, use `getCallerPrincipal`.

Note Principals participating in transactions may not change their principal association within those transactions.

Credentials

In the event that you want to associate other security-related attributes with a subject, you may use what JAAS calls *credentials*. Credentials are generic security-related attributes like passwords, public-key certificates, and such. Credentials can be any type of object, allowing you to migrate any existing credential information or implementation into JAAS. Or, if you want to keep some authentication data on a separate server or other piece of hardware, you can simply store a reference to the data as a credential. For example, you can use JAAS to support a security-card reader.

Public and private credentials

Credentials in JAAS come in two types, public and private. *Public* credentials do not require permissions to access them. *Private* credentials require security checks. Public credentials could contain public keys, and such, while private credentials are private keys, encryption keys, sensitive passwords, and such. Consider the following subject:

Java
```
public final class Subject {
   ...
   public Set getPublicCredentials()
}
```

C++
```
class Subject {
    public:
    Credential::set& getPrivateCredentials();
}
```

No additional permissions would be necessary to retrieve the public credentials from the subject, except in the case:

Java

```
public final class Subject {
   ...
   public Set getPrivateCredentials()
}
```

C++

```
class Subject {
    public:
    Credential::set& getPrivateCredentials();
}
```

For Java, permissions are required for code to access private credentials in a Subject. For cpp, all codes are local and therefore trusted. No permission required to access both public and private credentials. For more information on permissions in Java, consult the JAAS Specification from Sun Microsystems.

Authentication mechanisms and LoginModules

An *authentication mechanism* represents the encoding/decoding for communicating authentication information between various components of the security subsystem. For example, it represents how LoginModules communicate with the mechanism and how the mechanism on one process communicates with an equivalent mechanism on another process.

VisiSecure includes several common LoginModules for server and client authentication as well as the Security Provider Interface classes for Java and C++ that enable you to “plug-in” security service provider implementations of authentication and identification.

Authentication realms

An *authentication realm* represents a single user authentication mechanism, customized to point to a datasource which contains user information . This allows the authentication mechanism to be independent of the actual user database and therefore be used with multiple user databases that support the same authentication mechanism. For example, if a vendor writes an authentication module to work with LDAP, that mechanism can then be used to interact with different LDAP directories in different environments, without having to rewrite or otherwise modify the authentication mechanism.

For more information on the authentication realm (user domain), see “Basic security model” on page 9.

LoginModules

A *LoginModule* defines an authentication mechanism and provides the code to interact with a specific *type* of authentication mechanism. Each LoginModule is customized using authentication options that point it to a specific data source and provide other customizable behavior as defined by the author of the LoginModule.

Each LoginModule authenticates to a particular authentication realm (any authenticating body or authentication provider—;for example, an NT domain). An authentication realm is represented by a configuration entry in a JAAS configuration file. A JAAS configuration entry contains one or more LoginModule entries with associated options to configure the realm. For more information, see “Associating a LoginModule with a realm” on page 30.

LoginContext class and LoginModule interface

VisiSecure uses the class `LoginContext` as the user API for the authentication framework. The `LoginContext` class uses the JAAS configuration file to determine which authentication service to plug-in under the current application.

Java

```
public final class LoginContext {
   public LoginContext(String name)
   public void login()
   public void logout()
   public Subject getSubject()
}
```

C++

```
class LoginContext{
    public:
        LoginContext(const std::string& name, Subject *subject=0,
CallbackHandler *handler=0);
        void login();
        void logout();
        Subject &getSubject() const;
}
```

The authentication service itself uses the LoginModule interface to perform the relevant authentication.

Java

```
public interface LoginModule {
   boolean login();
   boolean commit();
   boolean abort();
   boolean logout();
}
```

C++

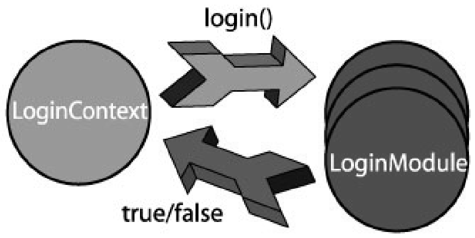
```
class LoginModule {
    public:
        virtual bool login()=0;
        virtual bool logout()=0;
        virtual bool commit()=0;
        virtual bool abort()=0;
}
```

It is possible to stack LoginModules and authenticate a subject to several services at one time.

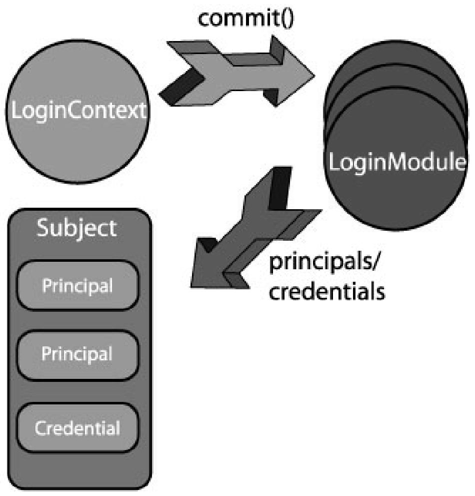
Authentication and stacked LoginModules

Authentication proceeds in two phases in order to assure that all stacked `LoginModules` succeed (or fail, otherwise).

1 The first phase is the “login phase,” during which the `LoginContext` invokes `login()` on all configured `LoginModules` and instructs each to attempt authentication.



2 If all necessary LoginModules successfully pass, the second, “commit phase” begins, and `LoginContext` calls `commit()` on each LoginModule to formally end the authentication process. During this phase the LoginModules also populate the subject with whatever credentials and/or authenticated principals are necessary for continued work.



Note If either phase fails, the `LoginContext` calls `abort()` on each `LoginModule` and ends all authentication attempts.

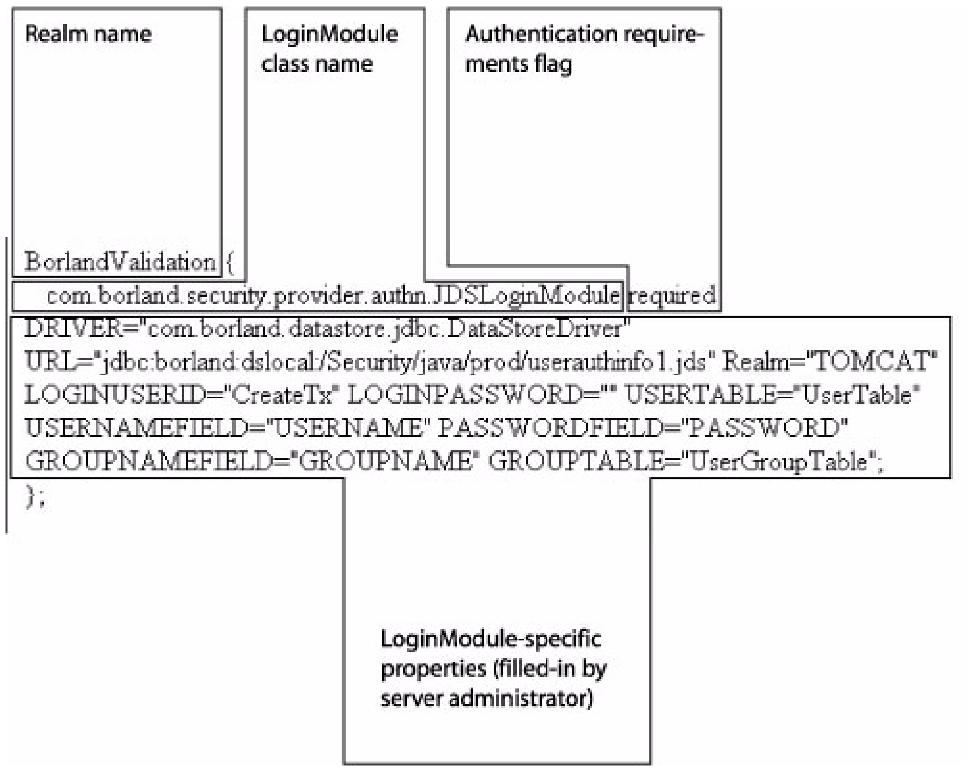
Associating a LoginModule with a realm

The Borland VisiBroker Server uses the JAAS configuration file to associate a LoginModule with a realm and store that information. The JAAS configuration file contains an entry for each authentication realm. The following is an example of a JAAS configuration entry:

```
MyLDAPRealm {
 com.borland.security.provider.authn.LDAPModule required URL=ldap://
directory.borland.com:389
}
```

The following figure shows the elements of a realm entry in the JAAS configuration file.

Figure 3.1 Realm entry in a JAAS config


Realm name
LoginModule class name
Authentication requirements flag
LoginModule-specific properties (filled-in by server administrator)

```
BorlandValidation {
  com.borland.security.provider.authn.JDSLoginModule required
DRIVER="com.borland.datastore.jdbc.DataStoreDriver"
URL="jdbc:borland:dslocal:/Security/java/prod/userauthinfo1.jds" Realm="TOMCAT"
LOGINUSERID="CreateTx" LOGINPASSWORD="" USERTABLE="UserTable"
USERNAMEFIELD="USERNAME" PASSWORDFIELD="PASSWORD"
GROUPNAMEFIELD="GROUPNAME" GROUPTABLE="UserGroupTable";
};
```

A server can support multiple realms. This allows clients to authenticate to any one of those realms. In order for a server to support multiple realms, all you need to do is configure the server with that many configuration entries. The name of the configuration entries is not predefined and can be user defined, for example `PayrollDatabase`.

Note There must be at least one LoginModule with the authentication requirements flag`=required`.

Syntax of a realm entry

Each realm entry has a particular syntax that must be followed. The following code sample shows the generic syntax for a realm entry:

```
//server-side realms for clients to authenticate against
realm-name {
   loginModule-class-name required|sufficient|requisite|optional
   [loginModule-properties];
   ...
};
```

Note The semicolon (“;”) character serves as the end-of-line for each LoginModule entry.

The following four elements are found in the realm entry:

- **Realm Name**—;the logical name of the authentication realm represented by the corresponding LoginModule configuration
- **LoginModule Name**—;the fully-qualified class name of the LoginModule to be used
- **Authentication Requirements Flag**—;there are four values for this flag—`required`, `requisite`, `sufficient`, and `optional`. You must provide a flag value for each LoginModule in the realm entry. Overall authentication succeeds only if all `required` and `requisite` LoginModules succeed. If a `sufficient` LoginModule is configured and succeeds, then only the `required` and `requisite` LoginModules listed prior to that `sufficient` LoginModule need to have succeeded for the overall authentication to succeed. If no `required` or `requisite` LoginModules are configured for an application, then at least one `sufficient` or `optional` LoginModule must succeed. The four flag values are defined as follows:
  - **required**—;the LoginModule is required to succeed. If it succeeds or fails, authentication still continues to proceed down the LoginModule list for each realm.
  - **requisite**—;the LoginModule is required to succeed. If it succeeds, authentication continues down the LoginModule list in the realm entry. If it fails, control immediately returns to the application—that is, authentication does not proceed down the LoginModule list.
  - **sufficient**—;the LoginModule is not required to succeed. If it does succeed, control immediately returns to the application—again, authentication does not proceed down the LoginModule list. If it fails, authentication continues down the list.
  - **optional**—;the LoginModule is not required to succeed. If it succeeds or fails, authentication still continues to proceed down the LoginModule list.
- **LoginModule-specific properties**—;each LoginModule may have properties that need to be provided by the server administrator. The necessary properties for each LoginModule provided by Borland are described below.

Borland LoginModules

Borland provides the following common LoginModules for server and client authentication. These LoginModules are used for both client authentication and authentication of the Borland VisiBroker Server itself to its operating environment.

Not all LoginModules have the same properties, and your own LoginModules may have different properties as well. Each LoginModule included with VisiBroker is described below, its syntax and properties explained, and a realm entry code sample is provided.

- BasicLoginModule—this LoginModule uses a proprietary schema to store and retrieve user information. It uses standard JDBC to store its data in any relational database. This module also supports the proprietary schema used by the Tomcat JDBC realm.
- JDBC LoginModule—this LoginModule uses a standard JDBC database interface to authenticate the user against native database user tables.
- LDAP LoginModule—similar to the JDBC LoginModule, but uses LDAP as its authentication back-end.
- Host LoginModule—for authentication to the operating system hosting the server. **This is the only LoginModule supported for C++.**

Basic LoginModule

This LoginModule uses a proprietary schema to store and retrieve user information. It uses standard JDBC to store its data in any relational database. This module also supports the proprietary schema used by the Tomcat JDBC realm.

```
realm-name {
   com.borland.security.provider.authn.BasicLoginModule authentication-
requirements-flag
   DRIVER=driver-name
   URL=database-URL
   TYPE=basic|tomcat
   LOGINUSERID=user-name
   LOGINPASSWORD=password
    [USERTABLE=user-table-name]
    [GROUPTABLE=group-table-name]
    [GROUPNAMEFIELD=group-name-field-of-GROUPTABLE]
    [PASSWORDFIELD=field-name]
    [USERNAMEFIELDINUSERTABLE=field-name]
    [USERNAMEFIELDINGROUPTABLE=field-name]
    [DIGEST=digest-name]
};
```

The elements in square brackets ("[..]") are used only if authenticating to the Tomcat Realm, where they would be required. Otherwise, the remaining properties are sufficient.

Property	Description
DRIVER	Fully-qualified class name of the database driver to be used with the password backend. For example, `com.borland.datastore.jdbc.DataStoreDriver`
URL	Fully-qualified URL of the database used for the realm.
TYPE	The schema to use for this realm. This LoginModule supports the schema used by the Tomcat JDBC realm and can be made to use that schema. Set this to "TOMCAT" to use the Tomcat schema. Set this to "basic" to use the Borland schema. **Note:** If this property is set to "TOMCAT," all other properties in square braces ("[..]") must also be set.
LOGINUSERID	Username needed to access the password backend database.
LOGINPASSWORD	Password needed to access the password backend database.
[USERTABLE]	Table name under which the username/password to be authenticated is stored.
[USERNAMEFIELDINUSER-TABLE]	The field name in USERTABLE where the userID can be read.
[USERNAMEFIELDIN-GROUPTABLE]	The field name in GROUPTABLE where the userID can be read, different from that in the USERTABLE.
[PASSWORDFIELD]	The field name in USERTABLE containing the password for the username to be authenticated.
[GROUPTABLE]	Table name under where the group information for the user is stored. When TYPE is set to "TOMCAT," the attribute represented by entries in this table are treated as roles rather than groups.
[GROUPNAMEFIELD]	Name of the field in GROUPTABLE containing the group name to be associated with the user. When TYPE is set to "TOMCAT," the attribute represented by entries in this table are treated as roles rather than groups.
[DIGEST]	The algorithm to use for digesting the password. This defaults to SHA under basic circumstances, but defaults to MD5 when TYPE is set to "TOMCAT".

```
Premium {
   com.borland.security.provider.authn.BasicLoginModule required
   DRIVER="com.borland.datastore.jdbc.DataStoreDriver"
   URL="jdbc:borland:dslocal:/Security/java/prod/userauthinfo1.jds"
   Realm="Basic"
   LOGINUSERID="CreateTx"
   LOGINPASSWORD="";
};
```

Since password should never be stored in clear text, VisiSecure always performs digest on the password and stores the result into database. The `digesttype` option defines the digest algorithm for this. By default, an SHA algorithm is used for basic-typed schema, while MD5 is used for tomcat-typed schema. You can change it by including and setting a `digesttype` option. In the case the corresponding digest type engine cannot be found by the JVM, SHA is used instead. If an SHA engine cannot be found either, the authentication will always fail.

JDBC LoginModule

This LoginModule uses a standard JDBC database interface for authentication.

```
realm-name {
   com.borland.security.provider.authn.JDBCLoginModule authentication-
requirements-flag
   DRIVER=driver-name
   URL=database-URL
    [DBTYPE=type]
   USERTABLE=user-table-name
   USERNAMEFIELD=user-name-field-of-USERTABLE
   ROLETABLE=role-table-name
   ROLENAMEFIELD=field-name
   USERNAMEFIELDINROLETABLE=field-name
};
```

Property	Description
DRIVER	Fully-qualified class name of the database driver to be used with the realm. For example, `com.borland.datastore.jdbc.DataStoreDriver`
URL	Fully-qualified URL of the database used for the password backend.
[DBTYPE= ORACLE|SYBASE|SQLSERVER|INTERBASE]	Supported database types. If this option is specified, the table information is preconfigured and need not be specified. The username/password still need to be specified to allow access to the system tables.
USERTABLE	Table name under where the database stores users.
USERNAMEFIELD	The field name in `USERTABLE` containing the usernames.
ROLETABLE	Table name where the database stores the roles of users.
ROLENAMEFIELD	Field name in `ROLETABLE` where role information is stored.
USERNAMEFIELDINROLE-TABLE	The username field name in the `ROLETABLE`.
USERNAME	The username needed to access the password backend database.
PASSWORD	The password needed to access the password backend database.

```
LIMS {
   com.borland.security.provider.authn.JDBCLoginModule required
   DRIVER="com.borland.datastore.jdbc.DataStoreDriver"
   URL="jdbc:borland:dslocal:/Security/java/prod/userauthinfo.jds"
   USERTABLE=myUserTable
   USERNAMEFIELD=userNames
   ROLETABLE=myRoles
   ROLENAMEFIELD=roleNames
   USERNAMEFIELDINROLETABLE=userRole
   USERNAME="\n"
   PASSWORD="\n";
};
```

LDAP LoginModule

Similar to the JDBC LoginModule, but using LDAP as its authentication backend.

```
realm-name {
   com.borland.security.provider.authn.LDAPLoginModule authentication-
requirements-flag
   INITIALCONTEXTFACTORY=connection-factory-name
   PROVIDERURL=database-URL
   SEARCHBASE=search-start-point
   USERATTRIBUTES=attribute1, attribute2, ...
   USERNAMEATTRIBUTE=attribute
   QUERY=dynamic-query
};
```

Property	Description
INITIALCONTEXTFACTORY	The InitialContextFactory class that is used by JNDI to bind to LDAP.
PROVIDERURL	The URL to the LDAP server of the form `ldap://<servername>:<port>`.
SEARCHBASE	The search base for the Directory to lookup.
USERATTRIBUTES	This option controls the attributes that are retrieved for a given user. This is a comma separated list of attributes that will be retrieved and stored for an authenticated user. These attributes can then be used in the authorization rules to determine whether a user belongs to a given role.
USERNAMEATTRIBUTE	This attribute represents what the user types in as the username. If set to `uid`, it would allow users to type their `uid` when asked for a username. If set to `mail`, it would allow the user to type their email when asked for a user name. When set to `DN`, the user will types their full `DN` to authenticate themselves.
QUERY	The Query options provides a mechanism to dynamically query the LDAP for other information and represent the results as attributes. For example, a user can be a member of a set of groups. It is useful to extract this information as the `GROUP` attribute so that it can be used in rules in the authorization domain. To achieve this, you can specify a query. Queries are of the format: `query.<suffix>="<attrname>=<ldap filter>";` The `suffix` can be anything that uniquely identifies this entry and there can be any number of queries specified. To insert the user's DN as part of the query, you should use `{0}`. The `LDAPLoginModule` will then replace the `{0}` with the actual DN of the user. For example, to query groups and store the results in the `GROUP` attribute, you say: `query.1="GROUP=(&(ou=groups)(uniquemember={0}))";` This will select all the groups (whose `ou` attribute has the value groups) that the user belongs to whose `uniquemember` attribute contains the user's DN, then stores the CN of the objects returned as the result as the values for the `GROUP` attribute for that user. If the attribute name specified is `ROLE`, then this attribute's treatment is exactly like that of the `JDBCLoginModule`. This mechanism can be used to store user roles in LDAP.

Host LoginModule

The HostLoginModule is used to authenticate to a UNIX or NT-based network.

```
realm-name {
   com.borland.security.provider.authn.HostLoginModule authentication-
requirements-flag;
};
```

No additional properties are necessary for the Host LoginModule.

```
Snoopy {
   com.borland.security.provider.authn.HostLoginModule required;
};
```

Server and Client Identification

In addition to the many clients and users that need to be authenticated to the various VisiBroker services, the Borland VisiBroker Server itself needs to be provided with its own identity. This allows the server to identify itself when it communicates with other secure servers or services. It also allows end-tier servers to trust assertions made by this server in the case where this server acts on behalf of other clients. In general, any system that needs to engage in secure communication as a client, must be configured to have an identity that represents the user/client on whose behalf it is acting. When using SSL with mutual authentication, a server also needs a certificate to identify itself to the client.

Setting the config file for client authentication

Each process uses its own configuration file containing the configuration for the set of authentication realms that the system supports for client authentication.

To set the location of the configuration file:

- Set the `vbroker.security.authentication.config` property to the path of the configuration file.

System Identification

The security configuration uses properties and a configuration file to define the identities that represent the system. This configuration file is populated with all the LoginModules necessary for authentication to the various realms to which this process needs to authenticate.

For example:

Set the property `vbroker.security.login=true`
Set the property `vbroker.security.login.realms=payroll,hr`
Set the following realm information in a file reference by
`vbroker.security.authentication.config=<config-file>`
Set the property `vbroker.security.callbackhandler=<callback-handler>`

In the `<config-file>` setup the following:

```
payroll {
com.borland.security.provider.authn.HostLoginModule required;
};

hr {
  com.borland.security.provider.authn.BasicLoginModule required
 DRIVER=com.borland.datastore.jdbc.DataStoreDriver
 URL="jdbc:borland:dslocal:../userdb.jds"
 TYPE=BASIC
 LOGINUSERID=admin
 LOGINPASSWORD=admin;
};
```

In this code sample:

- The process will already know something about the realms to which it needs to authenticate through the property `vbroker.security.login.realms`.
- The process knows it will authenticate to the host on which it is running (logically representing the "payroll" realm), and so sets itself up to invoke this LoginModule.
- The process also knows that it must log into the "hr" realm, and so sets up a LoginModule to this end as well.

The format of the realm information passed into `vbroker.security.login.realms` is as follows:

```
<authentication Mechanism>#<Authentication Target>
```

This format is called *Formatted Target*.

Formatted Target

A "realm" represents a configuration entry that represents an authenticating target. In the absence of a configuration file (such as in a client process, or for certificates, which have no representation in a JAAS config file), there needs to be a way to represent a target realm. This is done using a "formatted target". A formatted target is of the form:

```
<authentication mechanism>#<mechanism specific target name>
```

For example:

`Realm1`, `Realm3`, `GSSUP#Realm4`, and `Certificate#ALL`.

An authentication mechanism represents a "format" for communicating authentication information between various components of the security subsystem. For example, it represents how LoginModules communicate with the mechanism and how the mechanism on one process communicates with an equivalent mechanism on another process. The mechanism specific target name represents how the mechanism represents this target.

GSSUP mechanism

VisiSecure provides a mechanism for a simple username/password authentication scheme. This mechanism is called *GSSUP*. The OMG CSIv2 standard defines the interoperable format for this mechanism. The LoginModule to mechanism interaction model is defined by Borland. This is because the mechanism implementation needs to translate the information provided by a LoginModule to information (to a specific format) it can transmit over the wire using CSIv2.

As mentioned above, the target name for a mechanism is specific to that mechanism. For the GSSUP mechanism, the target name is a simple string representing a target realm (for example, in the JAAS configuration file, on the receiving tier). So, if a server has a configuration file with one realm defined, for example "ServerRealm", a client side representation of this realm would be:

```
GSSUP#ServerRealm
```

Note For convenience, since the GSSUP mechanism is always available in VisiBroker, you can omit the "GSSUP#" from the target name. However, this is only for the GSSUP mechanism. When the security service interprets a "realm" name, it first attempts to resolve the realm name with a local JAAS configuration entry. If that fails, it treats that realm name as representing "GSSUP#".

Certificate mechanism

The *Certificate mechanism* is a mechanism that is used for identification using certificates. This mechanism is different from GSSUP; certificates are used instead of username/password, and these identities are used at the SSL layer and not at the higher CSIv2 over IIOP layer.

You can put certificates into VisiSecure using certificate login or wallet APIs. When using wallet APIs, you need to specify the usage through the constant definitions in the `vbsec.h` file, class `vbsec::WalletFactory`. For more information, see “class vbsec::WalletFactory” on page 101.

Using certificate login, you need to specify the target realm using the following format:

```
Certificate#<target>
```

Note If you do not specify the usage, the default is `ALL`.

The following describes the available targets defined for the certificate login mechanism.

Table 3.1 Targets Defined for the Certificate Login Mechanism

Target	Description
Certificate#CLIENT	Identifies this process in a client role. When a user establishes an identity for this target, the certificate identity established will be used when this process acts as a client. In other words, this certificate will identify this process when it establishes outgoing SSL connections.
Certificate#SERVER	Identifies this process in a server role. When a user establishes an identity for this target, this process will use the certificate identity established to identify itself when it is accepting SSL connections.
Certificate#ALL	Identifies this process in all roles. This identity is used in both of the above roles.

A process can have either a client and server identity that are different or an identity that is used in all roles, but not both. In other words, you cannot establish an identity in the `Certificate#CLIENT` and the `Certificate#ALL` targets simultaneously.

Note For backward compatibility, wallet properties and SSL APIs are supported; certificate identities established this way are only treated as `Certificate#ALL`.

Using a Vault

When running clients, the security subsystem has the opportunity to interact with users to acquire credentials for authentication. This is done using a callback handler as defined by JAAS. However, when running servers (your Visibroker server or a Partition), it is not desirable or even possible to have user interaction at start up time. A typical example of this if the server is started as a service at the startup time of a host or from a automated script of some sort.

The *vault* was designed to provide the identity information to the security subsystem in such environments. Note that the vault itself is not directly tied to the security subsystem. It is merely a tool to replace the user interaction. In other words, a vault does not contain authenticated credentials. The security service will perform all appropriate authentication, but will receive information from the vault rather than by interacting with a callback handler. Due to the fact that no user interaction is required, the data in the vault, while sufficiently secure, does contain sensitive information (the usernames and passwords). Hence the vault file that is used for authentication of such servers must be protected using host security mechanisms (file permissions for example) or other equivalent approaches.

Creating a Vault

To create a vault, you can use the `vaultgen` command-line tool from your installation's `bin` directory. It's usage is as follows:

```
vaultgen [<driver-options>] -config <config.jaas-file> -vault <vault-name>
[<options>] <command>
```

`<driver-options>` are optional, and can be any of the following:

- `-J<option>`: passes a `-J` Java option directly to the JVM
- `-VBJVersion`: prints VBJ version information
- `-VBJDebug`: prints VBJ debugging information
- `-VBJClasspath`: specify a classpath that will precede the `CLASSPATH` environment variable
- `-VBJProp <name=value>`: passes the name/value pair to the VM
- `-VBJjavavm`: specify the path to the Java VM
- `-VBJaddJar <jar-file>`: appends the JAR file to the `CLASSPATH` before executing the VM

`-config <config.jaas-file>` points to the location of the `config.jaas` file containing the realms the identities in the vault will authenticate to. `-vault <vault-name>` is the path to the vault to be generated. You can also specify an existing vault in order to add additional identities to it.

`<options>` are other optional arguments, and can be any of the following:

- `-?, -h, -help, -usage`: prints usage information
- `-driverusage`: prints usage information, including driver options
- `-interactive`: enables an interactive shell

`<command>` is the command you want `vaultgen` to execute. You can select any one of the following:

- `login <realm|formatted-target>`: establishes an identity in the vault for a given realm or formatted target. The identity is first established when the vault is used for login during system startup.
- `logout <realm|formatted-target>`: removes an identity from the vault for a given realm or formatted target.
- `runas <alias> <realm>`: configures a run-as alias with the identity provided for a given realm.
- `removealias <alias>`: removes a configured run-as alias from the vault.
- `realms`: lists the available realms for this configuration.
- `mechanisms`: lists the available mechanisms (for formatted targets) for this configuration.
- `aliases`: lists configured aliases in the vault.
- `identities`: lists configured identities in the vault.

VaultGen example

Let's look at an example of VaultGen. Let's say we want to create a vault called `MyVault` for use with a domain called `base`. First, we need to know which security profile the domain is using so that we can reference its `config.jaas` file. We check the value of the domain's `vbroker.security.profile` property in the domain's `orb.properties` file:

```
#
# Security for the user domain
#
# Disable user domain security by default
vbroker.security.profile=default
vbroker.security.vault=${properties.file.path}/../security/scu_vault
```

The name of the security profile is `default`. This tells us that the path to the profile's `config.jaas` file is:

```
c:/BDP/var/security/profiles/default/config.jaas
```

Now we can check which realms are contained in the profile for which we want to create identities. We navigate to the installation's `bin` directory, and use the `realms` command:

```
c:\BDP\bin> vaultgen -config ../var/security/profiles/default/config.jaas -
vault myVault realms
```

`vaultgen` tells us the following realms are available:

```
The following realms are available:
- UserRealm
- MikeRealm
- BenRealm
```

Next we execute `vaultgen` using the `login` command:

```
c:\BDP\bin> vaultgen -config ../var/security/profiles/default/config.jaas -
vault myVault login UserRealm
```

`vaultgen` prompts us for the username and password for the `UserRealm`, which we enter. We then repeat the process for each additional realm. At the end of each command, `vaultgen` informs us that it has logged-in the new identity and saved changes to `MyRealm`.

```
Logged into realm BenRealm
Generating Vault to MyVault
```

The vault is created in the directory you specify in the command, in this case the `bin` directory. A good place to put the actual vault files are in the domain's `security` directory, located in:

```
<install-dir>/var/domains/<domain-name>/adm/security/
```

Client identification

There are situations, however, where the client process does not have any information on the realm that it needs to authenticate against. In this case, by default the client consults the server's IOR for a list of available realms, and the user is given the option to choose one to which to supply username and password. This username/password will be used by the server, which will consult its configuration file for the specified realm, and use the information collected from the client as data for its specified `LoginModule`.

For example, if the following is the server side configuration file, then the information collected or entered by a user will be used for its `JDBCLoginModule`.

```
SecureRealm{
   com.borland.security.provider.authn.JDBCLoginModule required
   DRIVER=F"com.borland.datastore.jdbc.DataStoreDriver"
   URL="jdbc:borland:dslocal:../userdb.jds"
   USERNAMEFIELD="USERNAME"
   GROUPNAMEFIELD="GROUPNAME"
   GROUPTABLE="UserGroupTable"
};
```

The default behavior of the process can be changed through properties. You can set the retry count by setting `vbroker.security.authentication.retryCount`. The default is `3`. The security properties including those for authentication are listed and described in the Chapter 9, “Security Properties for Java” and Chapter 10, “Security Properties for C++.”

Chapter
4

Authorization

Authorization is the process of verifying that the user has the authority to perform the requested operations on the server. For example, when a client accesses an enterprise bean method the application server must verify that the user of the client has the authority to perform such an access. Authorization occurs after authentication (confirming the user's identity).

Authorization is based on the user's identity and an access control list (ACL), which is a list of who can access designated functions. Typically, an access control list specifies a set of roles that can use a particular resource. It also designates the set of people whose attributes match those of particular roles, and who are then allowed to perform actions in those roles.

Borland uses an access control scheme based on roles. The deployment descriptor maintains a list of roles that are authorized to access each enterprise bean method. The Borland Security Service uses a role database (Role DB) to associate user identities with EJB roles. If a user is associated with at least one allowed role, the user may access the method.

Defining access control with Role DB

Role DB is a text file containing the roles and the access IDs associated with those roles. Each role in Role DB constitutes a *role entry*.

In VisiBroker, the Role DB file is located with the Security Profiles in the Borland Deployment Platform installation footprint:

```
<install-dir>/var/security/profiles/<profile-name>/
```

The default Role DB, `default.rolemap`, is located in:

```
<install-dir>/var/security/profiles/default/default.rolemap
```

In VisiBroker, the location of the rolemap file is specified through the property `vbroker.security.domain.<authorization-domain>.rolemap_path`

The Role DB file is used to determine the access rights of principals (client identities). Each role defined in the Role DB has client identities assigned to it. Access rights are granted based on roles rather than specific client identities. For example, the application may recognize a Sales Clerk role. User identities for all sales clerks can be assigned to the Sales Clerk role. Later, the Sales Clerk role is granted the right to perform certain operations, such as an `add_purchase_order` method, for example. All sales clerks associated with the Sales Clerk role are able to perform `add_purchase_order`.

Anatomy of Role DB

The Role DB file itself has the following form, and can contain multiple role entries:

```
role-name {
   assertion1 [, assertion2, ... ]
   ...
   [assertion-n]
   ...
}
role-name2 {
   assertion3 [, assertion4, ... ]
   ...
   [assertion-n]
   ...
}
```

A role entry is made up of a role name and a list of rules within curly braces (“{}”). A role must be made up of one or more rules. Each *rule* is a single line containing a list of comma-separated *assertions* for proper access identifications. Similarly, each rule must contain one or more assertions.

Each line in the Role Entry is a *rule*. Rules are read top-to-bottom, and authorization proceed until one succeeds or none succeed. That is, each rule is read as though separated by an “OR” operator. *Assertions* are separated on the same line by a comma (“,”). Assertions are read left-to-right, and all assertions must succeed in order for the rule to succeed. That is, each assertions in a rule is read as though separated by an “AND” operator.

Each rule must contain all necessary security information for a given Principal's security credentials. That is, each principal must have at least those attributes required from the rule—or exactly all the listed attributes. Otherwise authorization will not succeed.

Assertion syntax

There are a variety of ways to specify rules using logical operators with attribute/value pairs that represent the access identifications necessary for authorization. There is also a simplified syntax using the wildcard character (“*”) to give your rules more flexibility. Both of these are discussed below.

Using logical operators with assertions

Two logical operators are available in specifying attribute/value pairs.

Table 4.1 Logical Operators for Authorization Assertions

Operator	Description	Example
attribute **=** value	**equals**: attribute must equal value for authorization rule to succeed.	`CN=Russ Simmons`
attribute **!=** value	**not equal**: attribute must not equal value for authorization rule to succeed.	`CN!=Rick Farber`

A *value* can be any string, but the wildcard character, "*" has special uses. For example, the attribute/value pair `GROUP=*` matches for all GROUPs. The following role has two associated rules:

```
manager {
   CN=Kitty, GROUP=*
   GROUP=SalesForce1, CN=*
}
```

The role manager has two rules associated with it. In the first rule, anyone named `Kitty` is authorized for `manager`, regardless of Kitty's associated group at the time. The second rule authorizes anyone in the group `SalesForce1`, regardless of their common-name (`CN`).

Wildcard assertions

For complicated security hierarchies, it may be prudent to only look for only one or two attributes from the hierarchy in order to authorize a principal. Borland's security hierarchy starts with GROUPs at the top, then branching out into ORGANIZATIONs (O) and ORGANIZATIONAL UNITS (OU), and finally settling on COMMON NAMEs (CN).

For example, you may want to define a security role called SalesSupervisor that allows method permissions for managers of the sales force. (For this example, "sales" is the ORGANIZATION and "managers" is the ORGANIZATIONAL UNIT. You could do so with the following rule:

```
SalesSupervisor {
   GROUP=*, O=sales, OU=managers, CN=*
}
```

This rule does not specify values for GROUP or for COMMON NAME (presumably because they are not necessary). But remember, each rule must represent all possible values for a Principal's credentials. There are other means of representing this same information in a smaller space using *wildcard assertions*.

You make a wildcard assertion by placing the wildcard character ("*") in front of the assertion(s) in one of two ways. You may place the wildcard character in front of a single assertion, meaning that all possible security attributes are accepted but they *must* contain the single assertion. Or, you may place the wildcard character in front of a list of assertions separated by commas within parentheses. This means all possible security attributes are accepted but they *must* contain the assertions listed in the parentheses.

Making use of wildcard assertions, the role could also look like this:

```
SalesSupervisor {
   *O=sales, *OU=managers
}
```

Or, even more simply:

```
SalesSupervisor {
   *(O=sales, OU=managers)
}
```

All three code samples are different versions of the same rule.

Other assertions

Each role provides limited extensibility to others. You may, as a part of a role entry, specify a `role=existing-role-name` assertion that can extend an earlier role. You can also use customized code as your authorization mechanism rather than Role DB syntax by using the Authorization Provider Interface.

Recycling an existing role

You can refer to the rules from an existing role by using the rule-reference assertion—`role=role-name`. For example, let's say we have a group of marketers who are also sales supervisors that need to be authorized to the same code as Sales Supervisors. Building upon the `SalesSupervisor` code sample, we can create a new role entry as follows:

```
MarketSales {
   role=SalesSupervisor
   *(OU=marketing)
}
```

Now, everyone in role SalesSupervisor has access to the MarketSales role, as does anyone in the “marketing” OU.

Authorization domains

Each Role DB file is associated with an *authorization domain*. An authorization domain is a security context that is used to separate role DBs and hence their authorization permissions. For more information on the authorization domain in the context of the basic security model, see “Basic security model” on page 9.

EJBs can be deployed to multiple security contexts with different permissions and roles.

Note An authorization domain is associated with an EJB in its deployment descriptor.

You may use as many authorization domains as you wish, provided they are all registered with the VisiBroker ORB. You must do the following for each of your authorization domains:

- give it a name,
- set up default access,
- set up the Role DB,
- and set up alias(es).

To accomplish these items, the following properties must be set. For more information about these properties, see Chapter 9, “Security Properties for Java” or Chapter 10, “Security Properties for C++”:

Table 4.2 ORB Properties for Authorization

Property	Description
vbroker.security.authDomains=<domain1> [, <domain2>, <domain3>, ...]	A list of the authorization domain names
vbroker.security.domain.<domain-name>.defaultAccessRole=grant|deny	Whether or not to grant access to the domain by default in the absence of security roles for <domain-name>
vbroker.security.domain.<domain-name>.rolemap_path=<path>	Path of the Role DB file associated with the authorization domain *domain-name*. Although this can be a relative path, Borland recommends you make this path fully-qualified.
vbroker.security.domain.<domain-name>.runas.<role-name>=<alias>|use-caller-identity	Use this property to set up an identity for the run-as role `<role-name>`. The alias denotes an `alias` in the vault. Use `use-caller-identity` to use the caller principal itself as the principal identity for the run-as role.

Run-as Alias

Note Run-as aliases are not available under C++.

A Run-as Alias is a string identifying an authentication identity. It is defined in the vault and scoped within the VisiBroker ORB. This alias then represents a particular user. The identity is mapped to the alias using either the Context APIs or by defining it in the vault. The vault can contain a list of run-as aliases and the corresponding authenticating credentials for the identity to run-as. In both cases, the authenticating credentials (from the vault or wallet) are passed to the LoginModules, which authenticate those credentials and set them as fully authenticated identities corresponding to those credentials in the run-as map.

Authorization domains are then configured to run-as a given alias for a role in that domain. When a request is made to run-as a given role, then the authorization domain for that context is consulted to get the corresponding run-as alias. The run-as map is then consulted to get the identity corresponding to that alias, and this identity is used.

Run-as identities can also be configured to be certificate identities and not just username/password identities.

Run-as mapping

Note Run-as mapping is not available under C++.

Setting the `vbroker.security.domain.<domain-name>.runas.<role-name>` property effectively maps an alias to a bean's run-as role. Upon successful authorization, but before method invocation, the container checks the Run-as role specified in the EJB's deployment descriptor for the called method. If a run-as role exists, the container checks to see if there is an alias as well. If there is, when the bean makes an outgoing invocation it switches to the identity for that alias.

If, however, no alias is specified (that is, the run-as role name is set to `use-caller-identity`), the caller principal name is used.

CORBA authorization

Authorization in the CORBA environment allows only identities in specific roles for a given object can access that object. An object's access policy is specified by means of a Quality of Protection policy for the Portable Object Adapter (POA) hosting the object in question. Note that access policies can only be applied at the POA level.

Rolemaps are also used to implement authorization for CORBA objects. Similarly, the J2EE roles and concepts therein are also used in the CORBA environment.

Setting up authorization for CORBA objects

In order to set up authorization for an object, you need to perform the following:

1. Create a `ServerQopPolicy`.
2. Initialize the `ServerQopPolicy` with a `ServerQopConfig` object.
3. Implement an `AccessPolicyManager` interface, which takes the following form:

Java

```
interface AccessPolicyManager {
   public java.lang.String domain();
   public com.borland.security.csiv2.ObjectAccessPolicy getAccessPolicy(
      org.omg.PortableServer.Servant servant, byte[] object_id byte []
adapter_id);
}
```

C++

```
class AccessPolicyManager {
    public:
        virtual char* domain() =0;
        ObjectAccessPolicy_ptr getAccessPolicy(PortableServer_ServantBase*
_servant,
        const ::PortableServer::ObjectId& id,
        const::CORBA::OctetSequence& _adapter_id) =0;
}
```

This interface should return the authorization domain from the `domain()` method and uses it to set the access manager in the `ServerQopConfig` object. The domain specifies the name of the authorization domain associated with the proper rolemap. You set the location and name of the rolemap by setting the property:

```
vbroker.security.domain.<authorization-domain-name>.<rolemap-path>
```

where `<authorization-domain-name>` is a tautology, and `<rolemap-path>` is a relative path to the rolemap file. The `getAccessPolicy()` method takes an instance of the servant, the object identity, and the adapter identity and returns an implementation of the `ObjectAccessPolicy` interface.

1 Implement the `ObjectAccessPolicy` interface that returns the required roles and a run-as role for accessing a method of the object. There is no difference between J2EE and CORBA run-as roles in Borland's implementation. The `ObjectAccessPolicy` interface takes the following form:

Java

```
interface ObjectAccessPolicy {
    public java.lang.String[] getRequiredRoles(java.lang.String method);
    public java.lang,String getRunAsRole(java.lang.String method);
}
```

C++

```
class ObjectAccessPolicy {
    public:
        getRequiredRoles (const char* _method) =0;
}
```

The `getRequiredRoles()` method takes a method name as its argument and returns a sequence of roles. The `getRunAsRole()` method returns a run-as role, if any, for accessing the method.

Identities can be supplied using Callback Handlers. For more details, see Chapter 3, “Authentication.”

Chapter

5

Configuring Security Profiles for Domains

If you have Borland VisiBroker installed, you can define related sets of security parameters for each domain on your system. To enable a profile, you must set certain domain properties. Each profile is configured with the proper security properties, rolemaps, and configuration files. This section explains how to configure security profiles and provide the necessary data for VisiSecure to secure your applications.

Security Profiles

VisiSecure allows you to configure repositories of security information called *profiles*. Profiles contain the `config.jaas` file for defining LoginModules for authentication, as well as the authentication rolemap, Role DB. Profiles might also contain user databases and script files.

Profiles are defined in your installation's `security` directory, located in:

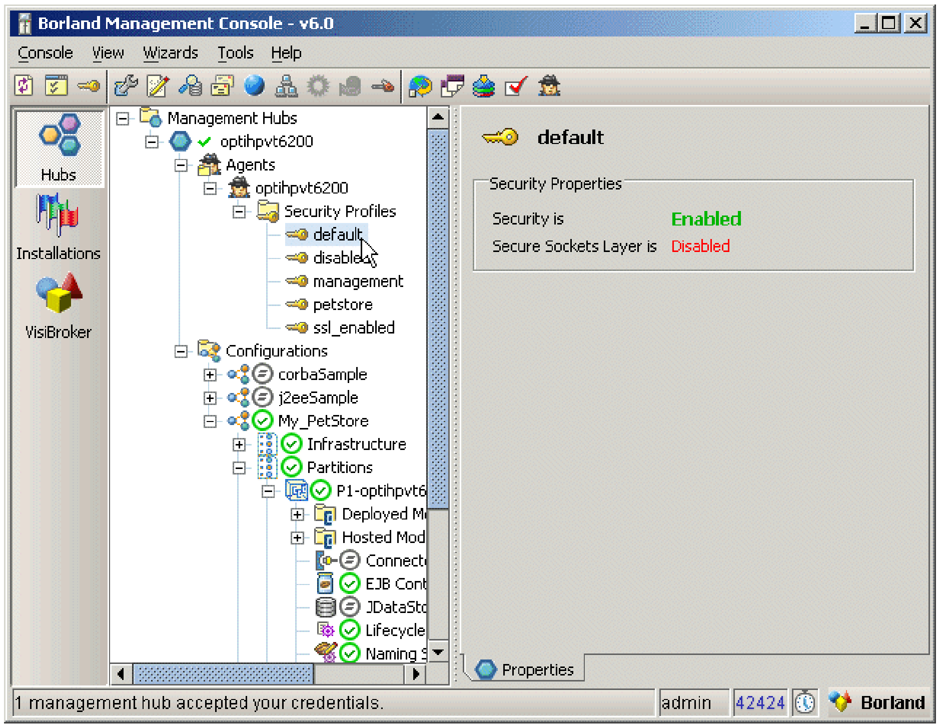
```
<install_dir>/var/security/profiles/<profile_name>
```

You can provide a unique name for each of your profiles. The `<profile_name>` directory must contain at least the following files:

- `config.jaas`: the JAAS authentication configuration file, in which your LoginModules are defined.
- `<role_db>.rolemap`: the Role DB file containing authorization data.
- `security.properties`: the central repository for the security properties that help define the operation of the VisiSecure service.

Profiles can also be viewed and configured using the Management Console. To view Security Profiles using the Management Console:

1. From the Hubs View, expand the Management Hubs node.
2. Expand the Agents node.
3. Select the Agent for the domain whose Security Profiles you wish to view.
4. Select the individual Security Profile.



default

Security Properties

Security is	Enabled
Secure Sockets Layer is	Disabled

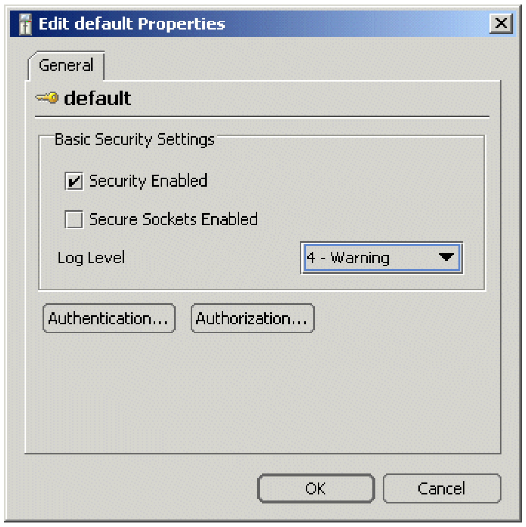
1 management hub accepted your credentials.

Enabling Security

For a domain to be secure, it must have an enabled Security Profile associated with it. To enable a Security Profile:

1 From the Hubs View, navigate to the profile you want to edit.

2 Right-click the profile and select Configure from the context menu. The Edit Default Properties dialog appears.


Edit default Properties

General

default

Basic Security Settings

[✓] Security Enabled

[ ] Secure Sockets Enabled

Log Level: 4 - Warning

3 Check the “Security Enabled” check box.

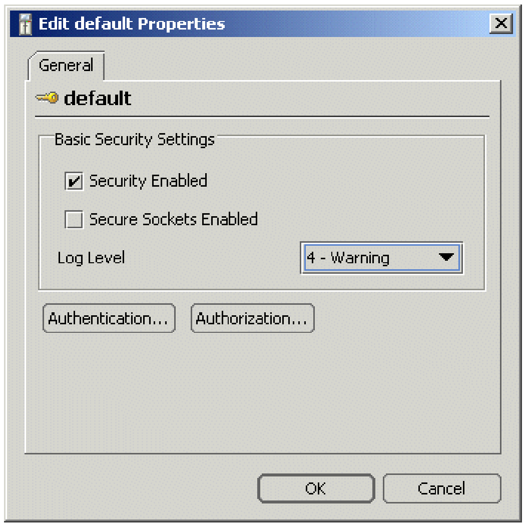
4 Click OK.

Enabling SSL

To use SSL, your Security Profile must have it enabled. To turn on SSL in a profile:

1 From the Hubs View, navigate to the profile you want to edit.

2 Right-click the profile and select “Configure...” from the context menu. The Edit Default Properties dialog appears.


Edit default Properties

General

default

Basic Security Settings

[✓] Security Enabled

[ ] Secure Sockets Enabled

Log Level: 4 - Warning

3 Check the Secure Sockets Enabled check box.

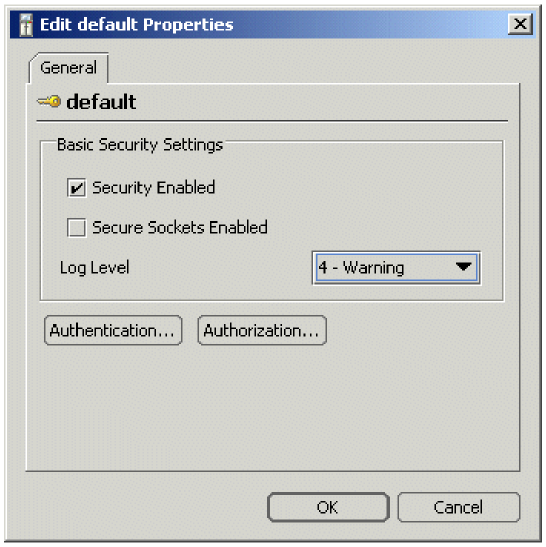
4 Click OK.

Setting the Log Level

To set the Log Level for a Security Profile:

1 From the Hubs View, navigate to the profile you want to edit.

2 Right-click the profile and select Configure from the context menu. The Edit Default Properties dialog appears.



Edit default Properties

General

default

Basic Security Settings

[✓] Security Enabled

[ ] Secure Sockets Enabled

Log Level: 4 - Warning

3 Select the desired Logging Level from the Log Level drop-down list.

4 Click OK.

Configuring Authentication

You can configure authentication for your profile by either creating a `config.jaas` file by hand or by using the Borland Management Console.

Creating the config.jaas file

The `config.jaas` file contains the data necessary to authenticate a user to one or more realms and defines an authentication mechanism and provides the code to interact with a specific type of authentication mechanism. For example, a `config.jaas` file could look like this:

```
UserRealm {
  com.borland.security.provider.authn.BasicLoginModule required
 DRIVER=com.borland.datastore.jdbc.DataStoreDriver
 URL="jdbc:borland:dslocal:${config.jaas.path}/userdb.jds"
 TYPE=BASIC
 LOGINUSERID=admin
 LOGINPASSWORD=admin;
};
```

This defines a realm called `UserRealm`, which requires the use of the `BasicLoginModule`. It also provides information on the database used and how to login to it. For information on LoginModules, their options, and the grammar of realm entries such as this, see Chapter 3, “Authentication.”

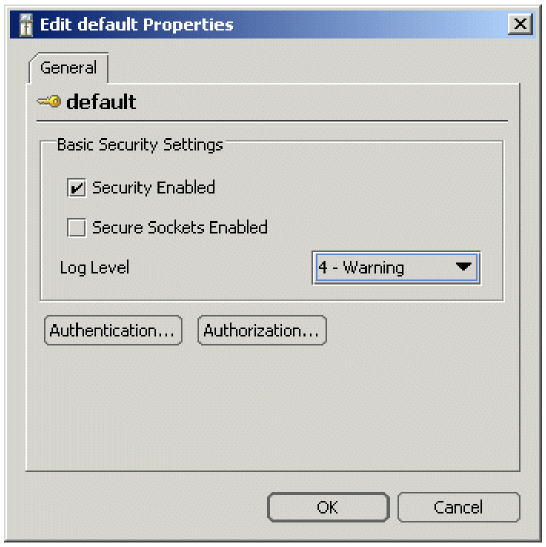
Once the `config.jaas` file is complete, it is placed in the profile's folder.

Configuring Authentication Using the Management Console

To configure authentication using the Management Console:

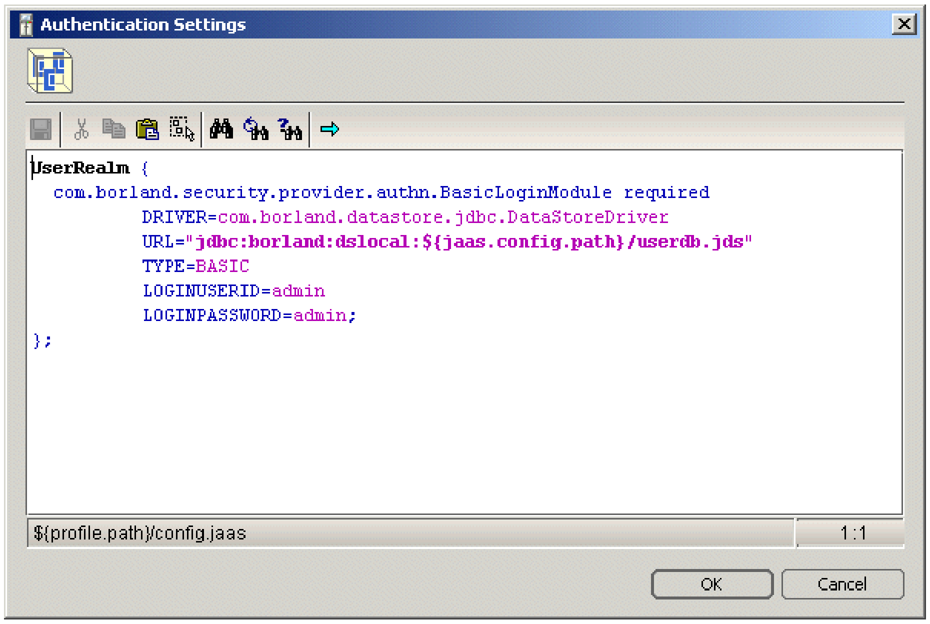
1 From the Hubs View, navigate to the profile you want to edit.

2 Right-click the profile and select Configure from the context menu. The Edit Default Properties dialog appears.



[✓] Security Enabled
[ ] Secure Sockets Enabled
Log Level: 4 - Warning

3 Click Authentication. The Authentication Settings dialog appears.



```
UserRealm {
  com.borland.security.provider.authn.BasicLoginModule required
          DRIVER=com.borland.datastore.jdbc.DataStoreDriver
          URL="jdbc:borland:dslocal:${jaas.config.path}/userdb.jds"
          TYPE=BASIC
          LOGINUSERID=admin
          LOGINPASSWORD=admin;
};
```

${profile.path}/config.jaas   1 : 1

4 The editing window in the Authentication Settings dialog shows the contents of the profile's `config.jaas` file. Edit or add realm entries. For more information, see Chapter 3, “Authentication.”

5 When you are finished, click OK.

Configuring Authorization

You can configure authorization by either creating your own Authorization Rolemap by hand or by using the Management Console.

About the rolemap file

The authorization rolemap is captured in a `.rolemap` file. Typically, you would name this file after your authorization domain (for example, a profile called “default” would typically call its rolemap `default.rolemap`) but this is not required. The rolemap file, also called *Role DB*, is a map of users to roles, or *access control list*. Typically, an access control list specifies a set of roles that can use a particular resource. The rolemap designates the set of people whose attributes match those of particular roles, and who are then allowed to perform those roles.

VisiSecure provides a mechanism for specifying role names and a set of attributes which define the roll. For example, the contents of Role DB could be:

```
ServerAdministrator {
  CN=*, OU=Security, O=Borland, L=San Mateo, S=California, C=US
  *(CN=admin)
  *(GROUP=administrators)
}

Customer {
  role=ServerAdministrator
  *(CN=borland)
  *(CN=pclare)
  *(CN=jeeves)
  *(GROUP=RegularUsers)
}
```

This defines two roles, `ServerAdministrator` and `Customer` along with a set of rules and attributes which define them. For information on how to define roles and write a customer rolemap, see Chapter 4, “Authorization.”

Once the rolemap file is complete, it is placed in the profile's folder with the `config.jaas` file.

Configuring Authorization Using the Management Console

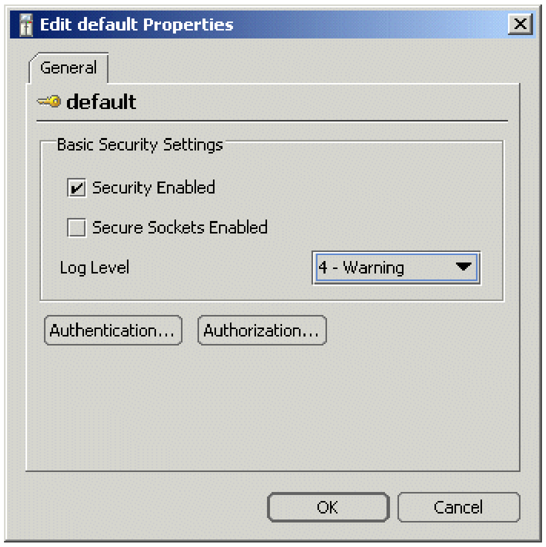
You use the Authorization Settings dialog to configure Authorization for a Security Profile. With this you can:

- View authorization rolemaps and rules.
- Add, edit, and remove authorization rolemaps for a domain.
- Add, edit, and remove roles within an authorization rolemap.
- Add, edit, and remove rules within a role.

To access the Authorization Settings dialog:

1 From the Hubs View, navigate to the profile you want to edit.

2 Right-click the profile and select Configure from the context menu. The Edit Default Properties dialog appears.

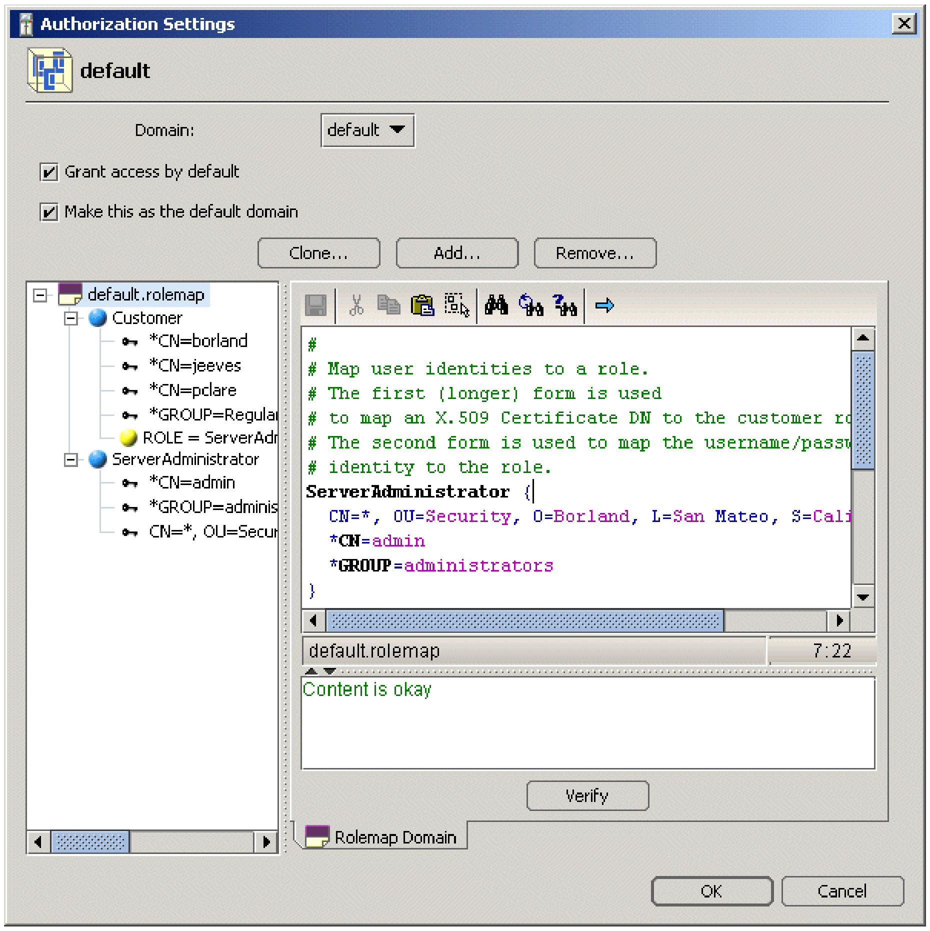


[✓] Security Enabled

[ ] Secure Sockets Enabled

Log Level: 4 - Warning

3 Click Authorization. The Authorization Settings dialog appears.



Domain: default

[✓] Grant access by default

[✓] Make this as the default domain

```
default.rolemap
  Customer
    *CN=borland
    *CN=jeeves
    *CN=pclare
    *GROUP=Regula
    ROLE = ServerAdr
  ServerAdministrator
    *CN=admin
    *GROUP=adminis
    CN=*, OU=Secur
```

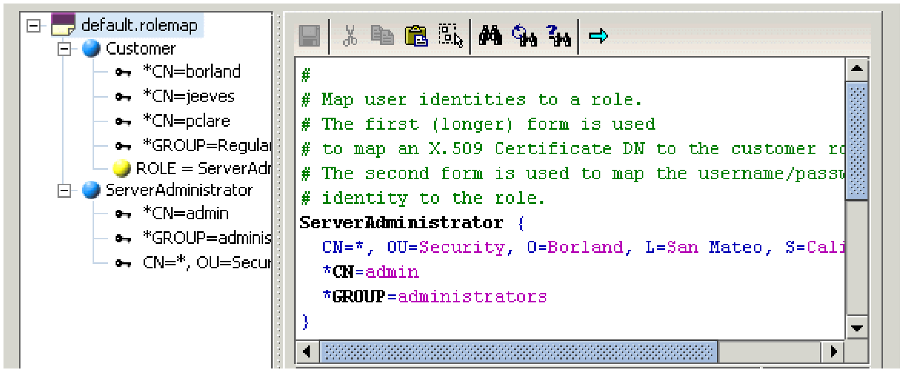
```
#
# Map user identities to a role.
# The first (longer) form is used
# to map an X.509 Certificate DN to the customer ro
# The second form is used to map the username/passw
# identity to the role.
ServerAdministrator {
  CN=*, OU=Security, O=Borland, L=San Mateo, S=Cali
  *CN=admin
  *GROUP=administrators
}
```

default.rolemap 7:22

Content is okay

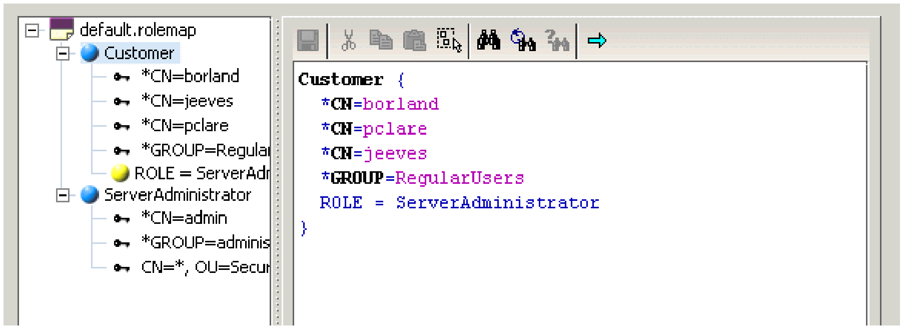
The left pane of the Authorization Settings dialog presents a tree view of the roles and their associated rules within the selected authorization domain. Selecting a node in the tree displays information about that node. There are three levels of nodes:

- **domain:** this node level shows the name of the rolemap file corresponding to the authorization domain. Its child nodes are roles. Selecting this node displays the entire rolemap file.



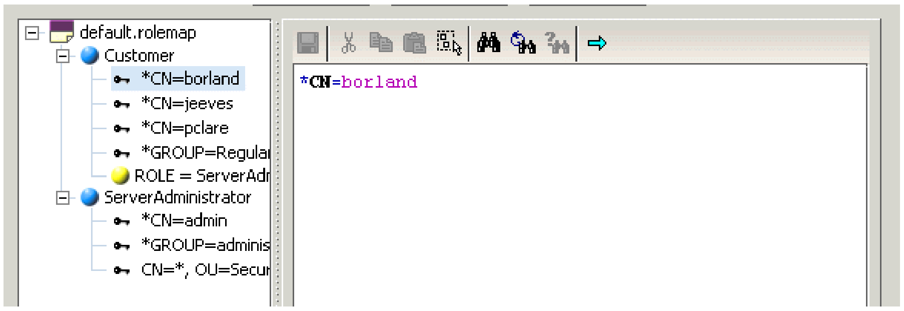
```
#
# Map user identities to a role.
# The first (longer) form is used
# to map an X.509 Certificate DN to the customer ro
# The second form is used to map the username/passw
# identity to the role.
ServerAdministrator {
  CN=*, OU=Security, O=Borland, L=San Mateo, S=Cali
  *CN=admin
  *GROUP=administrators
}
```

- **role:** this node represents a particular role within the domain. Selecting this node displays its role entry within the Role DB. Its child nodes are rules.



```
Customer {
  *CN=borland
  *CN=pclare
  *CN=jeeves
  *GROUP=RegularUsers
  ROLE = ServerAdministrator
}
```

- **rule:** this node represents an access rule for its parent role. Selecting this node displays the rule entry within the corresponding role entry.



```
*CN=borland
```

Working with Authorization Rolemaps and Domains

To edit the authorization rolemap:

1. Open the Authorization Settings dialog.
2. Select the domain node in the left-hand pane. The authorization rolemap file appears.
3. Edit the file in the content window.
4. When you are finished, Click OK.

To add a new authorization rolemap:

1. Open the Authorization Settings Dialog.
2. Click the Add button. The Add Domain dialog appears.
3. Enter a name for the new domain to which the new rolemap will belong and click OK.
4. The new rolemap is presented in the Authorization Settings dialog. You can switch to other rolemaps using the drop-down list at the top of the window.
5. Add roles and rules as necessary.
6. Click OK when you are finished.

To clone an existing rolemap:

1. Open the Authorization Settings Dialog.
2. Click Clone. The Clone Domain dialog appears.
3. Enter a name for the new domain to which the cloned rolemap will belong and click OK.
4. The new rolemap is presented in the Authorization Settings dialog. You can switch to other rolemaps using the drop-down list at the top of the window.
5. Add or edit roles and rules as necessary.
6. Click OK when you are finished.

To remove an authorization domain and its rolemap:

1. Open the Authorization Settings dialog.
2. Select the domain you wish to remove from the drop-down box at the top of the Window.
3. Click the Remove button. The domain is deleted.
4. Click OK when you are finished.

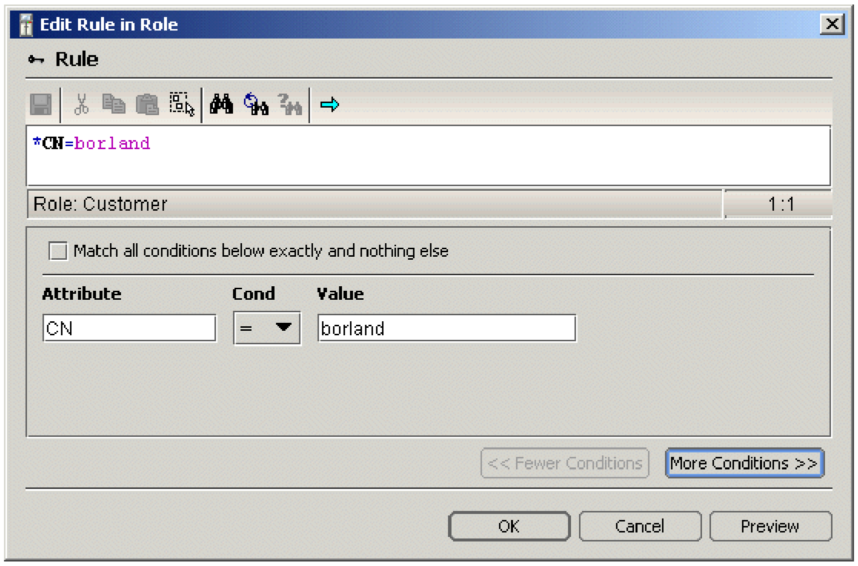
Editing Individual Roles

To edit a rule for an existing authorization role:

1 Open the Authorization Settings dialog.

2 Select the rule node in the left-hand pane. The rule representation appears in the content pane.

3 Click Edit button. The Edit Rule in Role dialog appears.



```
*CN=borland
```

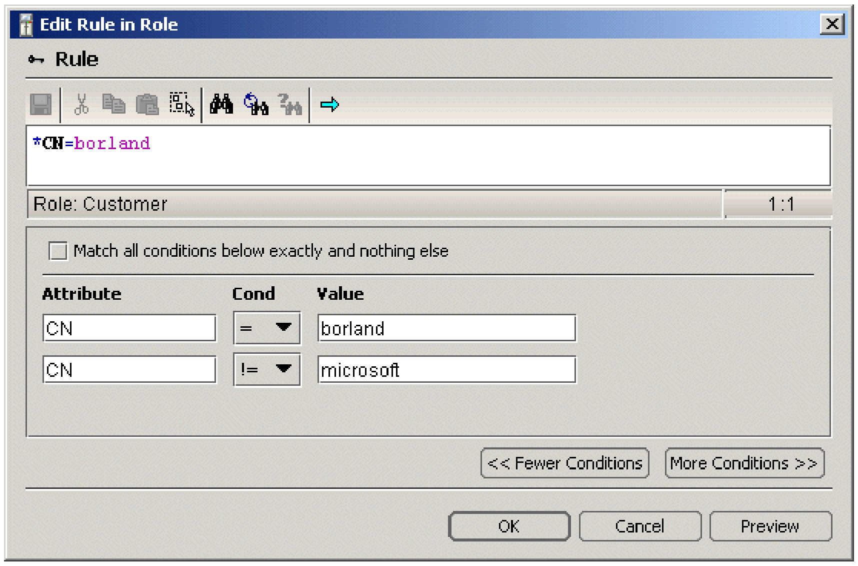
Role: Customer 1:1

☐ Match all conditions below exactly and nothing else

Attribute	Cond	Value
CN	=	borland

4 Edit the attribute, conditional operator, and value of the rule in the boxes provided.

5 If you would like to add an additional condition to the rule, click More Conditions. A new row appears.



```
*CN=borland
```

Role: Customer 1:1

☐ Match all conditions below exactly and nothing else

Attribute	Cond	Value
CN	=	borland
CN	!=	microsoft

6 Add additional attributes, operators, and values as required. You can remove the last condition by clicking the Fewer Conditions button.

7 To force strict access based on the rule, check the Match all conditions below exactly and nothing else checkbox.

8 Click preview to display the edited rule.

9 Click OK when you are finished.

Adding and Removing Roles

To add a new role to a rolemap:

1 Open the Authorization Settings dialog.

2 Right click the domain node to which you want to add the role. Select New Role from the context menu. The New Role dialog appears.

3 Give your new role a unique name within the authorization domain and Click OK.

4 The new role appears in the navigation pane. Click OK when you are finished.

To remove an existing role from a rolemap:

1 Open the Authorization Settings dialog.

2 Right click the role node you want to remove. Select Delete Role from the Context menu.

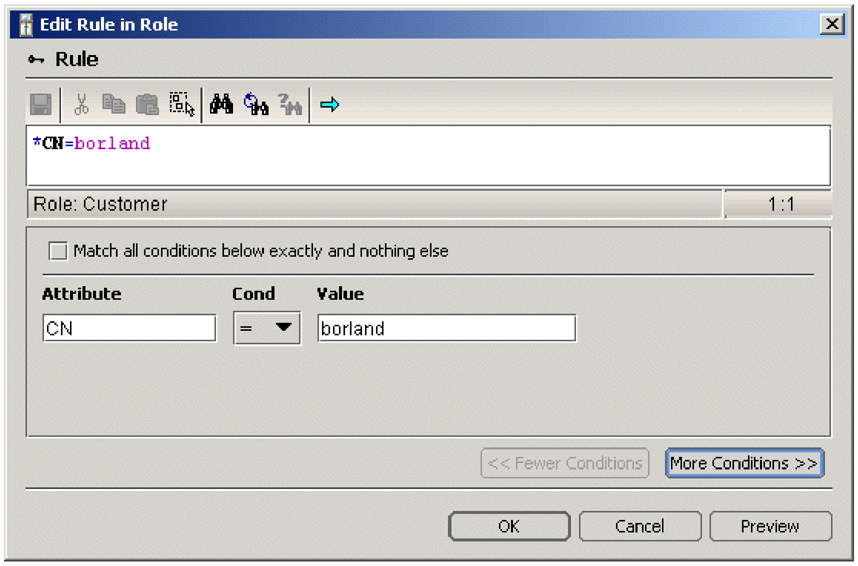
3 The role is removed from the rolemap file. Click OK when you are finished.

Adding and Removing Rules

To add a rule to a role entry:

1 Open the Authorization Settings dialog.

2 Right click the role node to which you want to add the rule. Select New Rule from the context menu. The New Rule in Role dialog appears.



```
*CN=borland
```

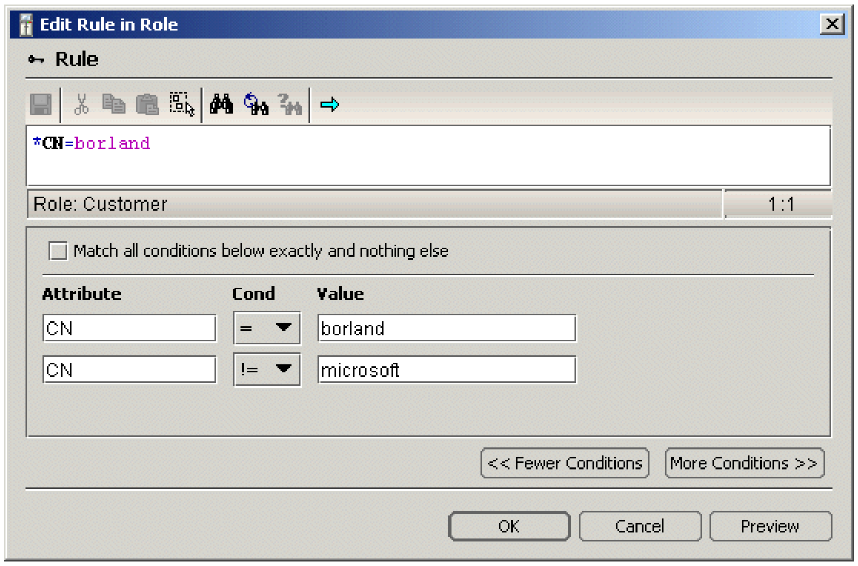
Role: Customer 1:1

☐ Match all conditions below exactly and nothing else

Attribute	Cond	Value
CN	=	borland

3 Edit the attribute, conditional operator, and value of the rule in the boxes provided.

4 If you would like to add an additional condition to the rule, click More Conditions. A new row appears.



```
*CN=borland
```

☐ Match all conditions below exactly and nothing else

Attribute	Cond	Value
CN	=	borland
CN	!=	microsoft

5 Add additional attributes, operators, and values as required. You can remove the last condition by clicking the Fewer Conditions button.

6 To force strict access based on the rule, check the Match all conditions below exactly and nothing else checkbox.

7 Click preview to display the edited rule.

8 Click OK when you are finished. The new rule appears in the tree.

9 Click OK when you are finished.

To remove a rule from a role:

1 Open the Authorization Settings dialog.

2 Right click the rule you want to delete.

3 Select Delete Rule from the context menu. The rule is removed from the tree.

4 Click OK when you are finished.

Specifying VisiSecure properties

Each profile contains a `security.properties` file which allows you to customize the behavior of VisiSecure. A typical properties file could look like the following:

```
# Disable user domain security by default
vbroker.security.disable=false

# Point the ORB at the authentication config files
vbroker.security.login=false
vbroker.security.authentication.config=${profile.path}/config.jaas

# Name the supplied authorization domain
vbroker.security.authDomains=default
vbroker.security.authDomains.default=default

# How to handle requests for methods not in the rolemap file - (grant|deny)
vbroker.security.domain.default.defaultAccessRule=grant
vbroker.security.domain.default.rolemap_path=${profile.path}/default.rolemap
```

Depending on whether your application is Java, C++, or both, you may have to set different properties with different types of values. See Chapter 10, “Security Properties for C++” and Chapter 9, “Security Properties for Java” for all the properties you can set in this file.

Once all the properties have been set, the `security.properties` file is placed in the profile folder.

Associating a Profile with a Domain

Security profiles are associated with the various domains on your system by setting properties. Once these properties are set, VisiSecure uses the settings found in the associated security profiles to secure your domains. Each domain on your system has an `orb.properties` file associated with it. This file is located in:

```
<install-dir>/var/domains/<domain_name>/adm/properties/orb.properties
```

To associate a profile and its settings with a domain:

1. Open the domain's `orb.properties` file.
2. Set the following property `vbroker.security.profile` to the name of the profile whose settings you want to use for the domain. For example:

   ```
   vbroker.security.profile=default
   ```

VisiSecure will now refer to the settings for the chosen security profile when performing security operations for that domain.

Using a Vault for a Domain

If you are using a vault to store system identities, you associate it with a domain so that it can be used. You do this by setting the domain's `vbroker.security.vault` property in the domain's `orb.properties` file. Simply set the property to the location of the domain's vault. For example:

```
vbroker.security.vault=c:/BDP/var/domains/base/adm/security/MyVault
```

Similar to the vault are other properties which only belong to the `orb.properties` file. These include secure listener ports, thread monitoring, and so forth. As a general rule, add only those properties to the profile that can be shared by multiple applications. Otherwise, use the appropriate process-specific ORB properties file to specify the property.

Chapter

6

Making Secure Connections (Java)

This section describes how to make secure connections for Java applications using VisiSecure. A brief introduction to the Java Secure Socket Extension (JSSE) is followed by the step-by-step details to securing an application.

JAAS and JSSE

VisiSecure uses the Java Authentication and Authorization Service (JAAS) to authenticate clients and servers to one another in J2EE applications. It provides a framework and standard interface for authentication users and assigning privileges. The VisiBroker Server uses the Java Secure Socket Extension (JSSE) to provide mechanisms for supporting SSL.

For information on the terms JAAS uses for its services, see “JAAS basic concepts” on page 25.

JSSE Basic Concepts

The VisiBroker ORB uses Internet Inter-ORB Protocol (IIOP) as its communication protocol. The Java Secure Socket Extension (JSSE) enables secure internet communications. It is a Java implementation of SSL and TLS protocols which include the functionality of data encryption, server and client authentication, and message integrity. JSSE also serves as a building block that can be simply and directly implemented in Java applications.

JSSE provides not only an API but also an implementation of that API. Implementations include socket classes, trust managers, key managers, SSLContexts, and a socket factory framework, in addition to public key certificate APIs.

JSSE also provides support for the underlying handshake mechanisms that are a part of SSL implementations. This includes cipher suite negotiation, client/server authentication, server session-management, and licensed code from RSA Data Security, Inc. JSSE uses Java KeyStores as a repository of Certificates and Private Keys. Further information on KeyStores can be obtained from Sun Microsystems’ JDK documentation. You can use JSSE properties for specifying trusted KeyStores and identity KeyStores.

Steps to secure clients and servers

Listed below are the common steps required for developing a secure client or secure server. For CORBA users the properties are all stored in files that are located through config files. Where ever appropriate the usage models for clients and servers are separately discussed. All properties can be set in the VisiBroker Management Console by right-clicking the node of interest in the Navigation Pane and selecting “Edit Properties.”

Note These steps are similar for both Java and C++ applications.

Important All security information, including RoleDBs, LoginModule configurations, and such can be set through the Management Console on the appropriate properties tabs.

Step One: Providing an identity

An identity can be a username/password/realm triad, or certificates can be used. These can be collected through JAAS modules or through APIs.

Clients For clients using usernames and passwords, there can be constraints about what the client knows about the server's realms. Clients may have intimate knowledge of the server's supported realms or none at all at the time of identity inquiry. Note also that clients authenticate at the server end.

Servers For servers using username and password identities, authentication is performed locally since the realms are always known.

There can be constraints on certificate identities as well, depending on whether they are stored in a KeyStore or whether they are specified through APIs.

Keeping these constraints in mind, the Borland VisiBroker Server supports the following usage models, any of which could be used to provide an identity to the server or client:

- “Username/password authentication, using JAAS modules, for known realms” on page 66
- “Username/password authentication, using APIs” on page 67
- “Certificate-based authentication, using KeyStores through property settings” on page 67
- “Certificate-based authentication, using KeyStores through APIs” on page 67
- “Certificate-based authentication, using APIs” on page 67
- “pkcs12-based authentication, using KeyStores” on page 67
- “pkcs12-based authentication, using APIs” on page 67

Username/password authentication, using JAAS modules, for known realms

If the realm to which the client wishes to authenticate is known, the client-side JAAS configuration would take the following form:

```
vbroker.security.login=true
vbroker.security.login.realms=<known-realm>
```

Username/password authentication, using APIs

The following code sample demonstrates the use of the login APIs. This case uses a wallet. For a full description of the four login modes supported, go to the VisiSecure for Java API and SPI sections.

```
public static void main(String[] args) {
   //initialize the ORB
   org.omg.CORBA.ORB orb = org.omg.CORBA.ORB.init(args, null);
   com.borland.security.Context ctx = (com.borland.security.Context)
      orb.resolve_initial_references("VBSecurityContext");
   if(ctx != null) {
      com.borland.securty.IdentityWallet wallet =
         new com.borland.security.IdentityWallet(<username>,
            <password>.toCharArray(), <realm>);
      ctx.login(wallet);
   }
}
```

Certificate-based authentication, using KeyStores through property settings

By setting the property `vbroker.security.login.realms=Certificate#ALL`, the client will be prompted for keystore location and access information. For valid values, see "Certificate mechanism" on page 38.

Certificate-based authentication, using KeyStores through APIs

You can use the same APIs discussed in "“Username/password authentication, using APIs” on page 67" to login using certificates through KeyStores. The realm name in the IdentityWallet should be `CERTIFICATE#ALL`, the `username` corresponds to an alias name in the default KeyStore that refers to a Key entry, and the `password` refers to the Private Key password (also the KeyStore password) corresponding to the same Key entry.

Certificate-based authentication, using APIs

If you do not want to use KeyStores directly, you can specify certificates and private keys using the `CertificateWallet` API. This class also supports the pkcs12 file format.

```
X509Certificate[] certChain = ...list-of-X509-certificates...
PrivateKey privKey = private-key
com.borland.security.CertificateWallet wallet =
   new com.borland.security.CertificateWallet(alias,
      certChain, privKey, "password".toCharArray());
```

The first argument in the new Certificate wallet is an alias to the entry in the KeyStore, if any. If you are not using keystores, set this argument to `null`.

pkcs12-based authentication, using KeyStores

You can use the same APIs discussed in “Username/password authentication, using APIs” on page 67 to login using pkcs12 KeyStores. The realm name in the IdentityWallet should be `CERTIFICATE#ALL`, the `username` corresponds to an alias name in the default KeyStore that refers to a Key entry, and the `password` refers to the password needed to unlock the pkcs12 file. The property `javax.net.ssl.KeyStore` specifies the location of the pkcs12 file.

pkcs12-based authentication, using APIs

See “Certificate-based authentication, using APIs” on page 67.

Step Two: Setting properties and Quality of Protection (QoP)

There are several properties that can be used to ensure connection Quality of Protection. The VisiBroker ORB security properties for Java can be used to fine-tune connection quality. For example, you can set the `cipherList` property for SSL connections to set cryptography strength.

QoP policies can be set using the `ServerQoPConfig` and the `ClientQoPConfig` APIs for servers and clients, respectively. These APIs allow you set target trust (whether or not targets must authenticate), the transport policy (whether or not to use SSL or another secure transport mechanism specified separately), and, for servers, an `AccessPolicyManager` that can access the RoleDB to set access policies for POA objects. For QoP API information, go to the VisiSecure for Java API and SPI book.

Step Three: Setting up Trust

Use the API `setTrustManager` for the proper security context to provide an `X509TrustManager` interface implementation. If you have certificates that need to be trusted, place them in a KeyStore and use `javax.net.ssl.trustStore` property to set it. A default `X509TrustManager` provided by the security service will be used if one is not provided.

Other trust policies are set in the QoP configurations. See "Step Two: Setting properties and Quality of Protection (QoP)" on page 68.

Step Four: Setting up the Pseudo-Random Number Generator

Setting up the PRNG is required if you intend to use SSL communication. Construct a `SecureRandom` object and seed it. Set this object as your PRNG by using the `com.borland.security.Context` interface, `setSecureRandom` method. For detailed information on the `com.borland.security.Context` interface, go to the VisiSecure for Java API and SPI book.

Step Five: If necessary, set up identity assertion

When a client invokes a method in a mid-tier server which, in the context of this request, invokes an end-tier server, then the identity of the client is internally asserted by the mid-tier server by default. Therefore, if `getCallerPrincipal` is called on the end-tier server, it will return the Client's principal. Here the client's identity is asserted by the mid-tier server. The identity can be a username or certificate. The client's private credentials such as private keys ore passwords are not propagated on assertion. This implies that such an identity cannot be authenticated at the end-tier.

If the user would like to override the default identity assertion, there are APIs available to assert a given Principal. These APIs can be called only on mid-tier servers in the context of an invocation and with special permissions. For more information, go to the VisiSecure for Java API and SPI book.

Examining SSL related information

Borland VisiBroker Server provides APIs to inspect and set SSL-related information. The `SecureContext` API is used to specify a Trust Manager, PRNG, inspect the SSL ciphersuites, and enable select ciphers.

Clients To examine peer certificates, use `getPeerSession()` to return an `SSLSession` object associated with the target. You can then use standard JSSE APIs to obtain the information therein.

Servers To examine peer certificates on the server side, you set up the SSL connection with `com.borland.security.Context` and use the APIs with `com.borland.security.Current` to examine the `SSLSession` object associated with the thread.

Creating Custom Plugins

There are various components of VisiSecure that allow for custom plug-ins. They are:

- LoginModules
- CallBack Handlers
- Authorization service provider via the SPI
- Assertion Trust via the SPI

LoginModules

You can implement your own LoginModules by extending `javax.security.auth.spi.LoginModules`. To use the LoginModule, you need to set it in the authentication configuration file, just like any other LoginModule. During runtime, the new customized module will need to be loaded by the secured application.

The syntax of the authentication configuration is as follows:

```
<realm-name> {
    <class-name-of-customized-LoginModule> <required|optional>;
}
```

CallbackHandlers

You can implement your own callback by extending `javax.security.auth.callback.CallBackHandler`. To use the callback, you need to set the property `vbroker.security.authentication.callbackHandler=<custom-handler-class-name>` in the security property file, just like any other callback handler. During runtime, the new customized module will need to be loaded by the secured application.

Authorization Service Provider

Authorization is the process of making access control decisions on behalf of certain resources based on security attributes or privileges. VisiSecure uses the notion of Permission in authorization. The class `RolePermission` is defined to represent a “role” as a permission. Authorization Services Providers in turn provide the implementation on the homogeneous collection of role permissions that associate privileges with particular resources.

Authorization service providers are tightly connected with Authorization Domains. Each domain has exactly one authorization service provider implementation. During the initialization of the ORB, the authorization domains defined by `vbroker.security.authDomains` is constructed, while the Authorization Service Provider implementation is instantiated during the construction of domain itself.

To plugin authorization service, you need to set properties:

```
vbroker.security.auth.domains=MyDomain
vbroker.security.domain.MyDomain.provider=MyProvider
vbroker.security.domain.MyDomain.property1=xxx
vbroker.security.domain.MyDomain.property2=xxx

vbroker.security.identity.attributeCodecs=MyCodec
vbroker.security.adapter.MyCodec.property1=xxx
vbroker.security.adapter.MyCodec.property2=xxx
```

The properties specified will be passed to the user plugin following the same mechanism as above.

Trust Providers

You can also plugin the assertion trust mechanism. Assertion can happen in a multi-hop scenario, or explicitly called through the assertion API. Server can have rules to determine whether the peer is trusted to make the assertion or not. The default implementation uses property setting to configure trusted peers on the server side. During runtime, peers must pass authentication and authorization in order to be trusted for making assertions. There can be only one Trust Provider for the entire security service.

To plugin the assertion trust mechanism, you will need to set the following properties:

```
vbroker.security.trust.trustProvider=MyProvider
vbroker.security.trust.trustProvider.MyProvider.property1=xxx
vbroker.security.trust.trustProvider.MyProvider.property2=xxx
```

The properties specified will be passed to the user plugin following the same mechanism as above.

Chapter

7

Making Secure Connections (C++)

This section describes how to make secure connections for C++ applications using VisiSecure.

Steps to secure clients and servers

Listed below are the common steps required for developing a secure client or secure server. For CORBA users the properties are all stored in files that are located through config files. Where ever appropriate the usage models for clients and servers are separately discussed. All properties can be set in the VisiBroker Management Console by right-clicking the node of interest in the Navigation Pane and selecting “Edit Properties.”

Note These steps are similar for both Java and C++ applications.

Important All security information, including RoleDBs and LoginModule configurations, can be set through the Management Console on the appropriate properties tabs.

Step One: Providing an identity

An identity can be a username/password/realm triad, or certificates can be used. These can be collected through LoginModules or through APIs.

Clients For clients using usernames and passwords, there can be constraints about what the client knows about the server's realms. Clients may have intimate knowledge of the server's supported realms or none at all at the time of identity inquiry. Note also that clients authenticate at the server end.

Servers For servers using username and password identities, authentication is performed locally since the realms are always known.

There can be constraints on certificate identities as well, depending on whether they are stored in a KeyStore or whether they are specified through APIs. The KeyStore in VisiSecure for C++ refers to a directory structure similar to a `trustpointRepository`, which contains certificate chain.

Keeping these constraints in mind, Borland VisiBroker supports the following usage models, any of which could be used to provide an identity to the server or client:

- "Username/password authentication, using LoginModules, for known realms" on page 72
- "Username/password authentication, using APIs" on page 72
- "Certificate-based authentication, using KeyStores through property settings" on page 72
- "Certificate-based authentication, using KeyStores through APIs" on page 72
- "Certificate-based authentication, using APIs" on page 73
- "pkcs12-based authentication, using KeyStores" on page 73
- "pkcs12-based authentication, using APIs" on page 73

Username/password authentication, using LoginModules, for known realms

If the realm to which the client wishes to authenticate is known, the client-side configuration would take the following form:

```
vbroker.security.login=true
vbroker.security.login.realms=<known-realm>
```

Username/password authentication, using APIs

The following code sample demonstrates the use of the login APIs. This case uses a wallet. For a full description of the four login modes supported, see Chapter 11, "VisiSecure for C++ APIs" and Chapter 12, "Security SPI for C++."

```
int main(int argc, char* const* argv) {
    // initialize the ORB
    CORBA::ORB_var orb = CORBA::ORB_init(argc, argv);
    CORBA::Object_var obj = orb-
>resolve_initial_references("VBSecurityContext");
    Context* c = dynamic_cast<Context*> (obj.in());
    // Obtain a walletFactory
    CORBA::Object_var o = orb->resolve_initial_references("VBWalletFactory");
    vbsec::WalletFactory* wf = dynamic_cast<vbsec::WalletFactory*>(o.in());
    vbsec::Wallet* wallet = wf->createIdentityWallet( <username>, <password>,
<realm>);
    c->login(*wallet);
}
```

Certificate-based authentication, using KeyStores through property settings

By setting the property `vbroker.security.login.realms=Certificate#ALL`, the client will be prompted for keystore location and access information. For valid values, see "Certificate mechanism" on page 38.

Certificate-based authentication, using KeyStores through APIs

You can use the same APIs discussed in ""Username/password authentication, using APIs" on page 72" to login using certificates through KeyStores. The realm name in the IdentityWallet should be `CERTIFICATE#ALL`, the `username` corresponds to an alias name in the default KeyStore that refers to a Key entry, and the `password` refers to the Private Key password (also the KeyStore password) corresponding to the same Key entry.

Certificate-based authentication, using APIs

If you do not want to use KeyStores directly, you can import certificates and private keys using the `CertificateFactory` API. This class also supports the pkcs12 file format.

```
CORBA::Object_var o = orb-
>resolve_initial_references("VBSecureSocketProvider");
vbsec::SecureSocketProvider* ssp =
dynamic_cast<vbsec::SecureSocketProvider*>(o.in());

const vbsec::CertificateFactory& cf = ssp->getCertificateFactory ();
```

The first argument in the new Certificate wallet is an alias to the entry in the KeyStore, if any. If you are not using keystores, set this argument to `null`.

pkcs12-based authentication, using KeyStores

You can use the same APIs discussed in "Username/password authentication, using APIs" on page 72 to login using pkcs12 KeyStores. The realm name in the IdentityWallet should be `CERTIFICATE#ALL`, the `username` corresponds to an alias name in the default KeyStore that refers to a Key entry, and the `password` refers to the password needed to unlock the pkcs12 file. The property `javax.net.ssl.KeyStore` specifies the location of the pkcs12 file.

pkcs12-based authentication, using APIs

See "Certificate-based authentication, using APIs" on page 73.

Step Two: Setting properties and Quality of Protection (QoP)

There are several properties that can be used to ensure connection Quality of Protection. The VisiBroker ORB security properties for C++ can be used to fine-tune connection quality. For example, you can set the `cipherList` property for SSL connections to set cryptography strength.

QoP policies can be set using the `ServerQoPConfig` and the `ClientQoPConfig` APIs for servers and clients, respectively. These APIs allow you set target trust (whether or not targets must authenticate), the transport policy (whether or not to use SSL or another secure transport mechanism specified separately), and, for servers, an `AccessPolicyManager` that can access the RoleDB to set access policies for POA objects.

Step Three: Setting up Trust

Setting up of trust can be done through property `vbroker.security.trustpointRepository=Directory:<path to directory>`, where the directory contains the trusted certificates.

Other trust policies are set in the QoP configurations. See "Step Two: Setting properties and Quality of Protection (QoP)" on page 73.

Step Four: If necessary, set up identity assertion

When a client invokes a method in a mid-tier server which, in the context of this request, invokes an end-tier server, then the identity of the client is internally asserted by the mid-tier server by default. Therefore, if `getCallerSubject` is called on the end-tier server, it will return the Client's principal. Here the client's identity is asserted by the mid-tier server. The identity can be a username or certificate. The client's private credentials such as private keys ore passwords are not propagated on assertion. This implies that such an identity cannot be authenticated at the end-tier.

If the user would like to override the default identity assertion, there are APIs available to assert a given Principal. These APIs can be called only on mid-tier servers in the context of an invocation and with special permissions.

Examining SSL related information

Borland VisiBroker provides APIs to inspect and set SSL-related information. The `SecureContext` API is used to inspect the SSL ciphersuites and enable select ciphers.

Clients To examine peer certificates, use `getPeerSession()` to return an `SSLSession` object associated with the target. You can then use standard JSSE APIs to obtain the information therein.

Servers To examine peer certificates on the server side, you set up the SSL connection with `com.borland.security.Context` and use the APIs with `com.borland.security.Current` to examine the `SSLSession` object associated with the thread.

Creating Custom Plugins

There are various components of VisiSecure that allow for custom plug-ins. They are:

- LoginModules
- CallBack Handlers
- Authorization service provider via the SPI
- Assertion Trust via the SPI

In order for VisiSecure for C++ to find user implementations, all plugins must use the `REGISTER_CLASS` macro provided by VisiSecure to register their classes to the security service. When specifying the registered class, the name of the class must be specified in full together with the name space. Name spaces must be specified in a normalized form, with either a “.” or “::” separated string starting from the outermost name space. For example:

```
MyNameSpace {
  class MyLoginModule {
    ......
  }
}
```

would be specified as either `MyNameSpace.MyLoginModule` or `MyNameSpace::MyLoginModule`.

LoginModules

You can implement your own LoginModules by extending `vbsec::LoginModule`. To use the LoginModule, you need to set it in the authentication configuration file, just like any other LoginModule. During runtime, the new customized module will need to be loaded by the secured application.

The syntax of the authentication configuration is as follows:

```
<realm-name> {
    <class-name-of-customized-LoginModule> <required|optional>;
}
```

Note There is implicit replacement of the character "." to "::" by VisiSecure. Hence, `com.borland.security.provider.authn.HostLoginModule` is equivalent to `com::borland::security::provider::authn::HostLoginModule`.

CallbackHandlers

You can implement your own callback by extending `vbsec::CallbackHandler`. To use the callback, you need to set the property `vbroker.security.authentication.callbackHandler=<custom-handler-class-name>` in the security property file, just like any other callback handler. During runtime, the new customized module will need to be loaded by the secured application.

Authorization Service Provider

Authorization is the process of making access control decisions on behalf of certain resources based on security attributes or privileges. VisiSecure uses the notion of Permission in authorization. The class `RolePermission` is defined to represent a "role" as a permission. Authorization Services Providers in turn provide the implementation on the homogeneous collection of role permissions that associate privileges with particular resources.

Authorization service providers are tightly connected with Authorization Domains. Each domain has exactly one authorization service provider implementation. During the initialization of the ORB, the authorization domains defined by `vbroker.security.authDomains` is constructed, while the Authorization Service Provider implementation is instantiated during the construction of domain itself.

To plugin authorization service, you need to set properties:

```
vbroker.security.auth.domains=MyDomain
vbroker.security.domain.MyDomain.provider=MyProvider
vbroker.security.domain.MyDomain.property1=xxx
vbroker.security.domain.MyDomain.property2=xxx

vbroker.security.identity.attributeCodecs=MyCodec
vbroker.security.adapter.MyCodec.property1=xxx
vbroker.security.adapter.MyCodec.property2=xxx
```

The properties specified will be passed to the user plugin following the same mechanism as above.

Trust Providers

You can also plugin the assertion trust mechanism. Assertion can happen in a multi-hop scenario, or explicitly called through the assertion API. Server can have rules to determine whether the peer is trusted to make the assertion or not. The default implementation uses property setting to configure trusted peers on the server side. During runtime, peers must pass authentication and authorization in order to be trusted for making assertions. There can be only one Trust Provider for the entire security service.

To plugin the assertion trust mechanism, you will need to set the following properties:

```
vbroker.security.trust.trustProvider=MyProvider
vbroker.security.trust.trustProvider.MyProvider.property1=xxx
vbroker.security.trust.trustProvider.MyProvider.property2=xxx
```

The properties specified will be passed to the user plugin following the same mechanism as above.

Chapter

8

Security for the Web components

The Borland VisiBroker Server allows you to secure the web components using the conventions of encryption, authentication, and authorization.

Like the security measures provided by the J2EE standards, where security is set at the module level, you can also secure web components by declaring the security mechanism within their configuration files.

Security for the Apache web server

The Apache web server uses data transport encryption technology for security. VisiBroker supports the `mod_ssl` module for this purpose. This module provides strong cryptography for Apache Web Server via the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) protocols by the help of the Open Source SSL/TLS toolkit OpenSSL.

The VisiBroker Server provides `mod_ssl` which is now supported directly into the Apache web server, and is based on OpenSSL version 0.9.6g.

Modifying the Apache configuration file for mod_ssl

To enable `mod_ssl`, you must modify the `httpd.conf` file located in: `<install_dir>/var/domains/<domain_name>/configurations/<configuration_name>/mos/<apache_ManagedObject_name>/conf` by un-commenting the following line:

```
LoadModule ssl_module <install_dir>/lib/<apache_ManagedObject_name>/mod_ssl.so
```

The following describes the mod_ssl directives:

```
<IfModule mod_ssl.c>
SSLEngine on
SSLRandomSeed startup builtin
SSLRandomSeed connect builtin
SSLCertificateFile <install_dir>/var/domains/<domain_name>/configurations/
<configuration_name>/mos/<apache_ManagedObject_name>/conf/ssl.crt/server.crt
SSLCertificateKeyFile <install_dir>/var/domains/<domain_name>/configurations/
<configuration_name>/mos/<apache_ManagedObject_name>/conf/ssl.key/server.key
#
# Uncomment the following to enable SSL certificate and related information to
be exported to the apache environment

#SSLOptions +StdEnvVars +ExportCertData

</IfModule>
```

Warning The mod-ssl Apache module causes the Apache web server to become unstable when used with the KeepAlive connection option on (the default). This is a known defect and users should use caution after enabling the mod-ssl Apache module.

Table 8.1 mod_ssl directives

SSL-specific directive	Description
SSLEngine	The placement of the SSLEngine is significant. It can be placed either at the server level, in which case the server will respond only to HTTPS connections or within a particular virtual host, which can then be associated with a particular port number (usually 443), so that both regular HTTP connections and HTTPS connections can be handled.
SSLRandomSeed	Determines the source of randomness used by the mod_ssl encryption facilities. The randomness built into mod_ssl is sufficient to get you started, however, it is not really random enough to be used in a truly secure environment. Preferably, a UNIX random device such as /dev/random or /dev/urandom is used. The SSLRandomSeed directive must be defined at the server level.
SSLCertificateFile	The placement of the SSLCertificateFile is significant. It can be placed either at the server level, in which case the server will respond only to HTTPS connections or within a particular virtual host, which can then be associated with a particular port number (usually 443), so that both regular HTTP connections and HTTPS connections can be handled. This file can be given any name and may be placed in any accessible directory.
SSLCertificateKeyFile	The placement of the SSLCertificateKeyFile is significant. It can be placed either at the server level, in which case the server will respond only to HTTPS connections or within a particular virtual host, which can then be associated with a particular port number (usually 443), so that both regular HTTP connections and HTTPS connections can be handled. This file can be given any name and may be placed in any accessible directory.
SSLOptions +StdEnvVars +ExportCertData	By default, commented out. If you want to enable Certificate Passthrough, you must uncomment this directive which instructs mod_ssl to export the SSL certificate and related information passed to it by the browser into a shared environment.

Important The VisiBroker Server does not provide the key_file and certificate_file which must be generated. See "Creating key and certificate files" on page 79.

For additional information on mod_ssl configuration, visit http://www.modssl.org/docs.

Creating key and certificate files

The VisiBroker Server provides the “openssl” utility so that you can generate the required key and certificate files for `mod_ssl`. The `openssl` utility is located in:

```
<install_dir>/bin/<apache_ManagedObject_name>/openssl/
```

- For Windows, after double-clicking the openssl executable, a command window appears.
- For UNIX, simply follow the steps below.

Note UNIX also requires a random data source for seeding. If you do not have a `/dev/rand` device installed, you need to provide a file with a random number greater than 512 bytes in length.

The `openssl` executable first searches the environment for a variable named “RANDFILE”. If that is found, that value is assumed to be a file containing at least 512 bytes of data. If the environment variable `RANDFILE` is not found, the executable searches the root of your home directory for a <file_name>.rnd. If that is found, it is assumed to contain at least 512 bytes of data for the seed. If you do not have a `/dev/rand` device, and do not provide any other alternative, certificate generation will fail.

To generate the files:

1 Create a private key for your server:

```
OpenSSL> genrsa -out <key_file>
```

2 Generate a certificate request:

```
OpenSSL> req -new -key <key_file> -out <request_file> -config <install_dir>/bin/
<apache_ManagedObject_name>/openssl.cnf
```

3 Create a temporary certificate:

```
OpenSSL> req -x509 -key <key_file> -in <request_file> -out <certificate_file> -
config <install_dir>/bin/<apache_ManagedObject_name>/openssl.cnf
```

Using the configuration from:

```
<install_dir>/bin/<apache_ManagedObject_name>/openssl.cnf
```

You are prompted for the following information.

Note Pressing `Enter` in response to each query (accepting each default value) is sufficient for creating a temporary certificate.

```
Using configuration from
<install_dir>/bin/<apache_ManagedObject_name>/openssl.cnf
You are about to be asked to enter information that will be incorporated into
your certificate request.
What you are about to enter is what is called a Distinguished Name or a
DN.
There are quite a few fields but you can leave some blank.
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:
State or Province Name (full name) [Some-State]:
Locality Name (such as, city) []:
Organization Name (such as, company) [Internet Widgits Pty Ltd]:
Organizational Unit Name (such as, section) []:
Common Name (such as, YOUR name) []:
Email Address []:
```

```
Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:
An optional company name []:
Using configuration from
<install_dir>/bin/<apache_ManagedObject_name>/openssl.cnf
```

4 The key file created must be moved to the location specified in `SSLCertificateKeyFile`.

5 The certificate file must be moved to the location specified in `SSLCertificateFile`.

Note The generated certificate file is sufficient for testing purposes. However, in a production environment, you must obtain a certificate signed by a recognized certificate authority (CA).

Verifying that mod_ssl is active

In order to verify that `mod_ssl` is working, try to access your web server using `https`. How you do this depends on where you have placed the `SSLEngine` directive (see "Creating key and certificate files" on page 79).

- If `SSLEngine` is defined at the server level, all server access goes through `mod_ssl`.
- If `SSLEngine` is defined on the host level, you must direct your access to that particular host by providing the correct port number or IP address.

  When attempting to make a secure connection from a web browser, make sure that you use "https" instead of "http" in your URL. For example:

  ```
  https://host.domain.com:443/index.html
  ```

To find out more information about your web server, you can configure `mod_info` to serve configuration information.

1 To enable `mod_info`, you must modify the `httpd.conf` file located in:

```
<install_dir>/var/domains/<domain_name>/configurations/<configuration_name>/
mos/<apache_ManagedObject_name>/conf
```

by un-commenting the following line:

```
LoadModule info_module <install_dir>/lib/<apache_ManagedObject_name>/mod_info.so
```

2 Next, you need to uncomment the following section of code:

```
<Location /server-info>
   SetHandler server-info
   Order deny, allow
#   Deny from all
   Allow from .your_domain.com
</Location>
```

Important Do not uncomment the `Deny from all` directive.

3 Edit the `Allow from .your_domain.com` directive to match your domain.

Your Apache web server will now respond to the following query by displaying server configuration information:

```
https://<server_name>/server-info
```

Note This query does not require a secure "https" connection; `mod_info` configuration is independent of the protocol used by the Apache web server. server.

Enabling certificate passthrough to the Borland web container

By enabling mod_ssl for your Apache web server, you can configure your web server to handle "https" (SSL) type connections. As a result, any SSL authentication information is consumed by the Apache web server. If you want your Borland web container to manage the SSL authentication, the Apache web server and IIOP connector need to pass the SSL authentication information through to the Borland web container.

By implementing the VisiBroker "certificate passthrough" feature, you can give your Borland web container access to all the browser-supplied SSL information, as if the Apache web server is not between the browser and the web container. Additionally, your Borland web container is given control of the SSL-based authorization. With this feature, the web applications can use the auth-method `CLIENT_CERT_AUTH` even when the Apache web server is in between the browser and the Borland web container.

Configuring Apache to "passthrough" the SSL certificate and related information

Enabling certificate passthrough consists of the following two steps:

1. Configuring `mod_ssl` module of the `httpd.conf` file to export the SSL authentication information passed to it by the browser into a shared environment.

   This shared environment allows the `mod_iiop` IIOP connector to obtain this data for subsequent forwarding to the Borland web container.
2. Configuring the mod_iiop IIOP connector to forward any SSL authentication information to the Borland web container.

Configuring the `mod_ssl` module of the httpd.conf file for certificate passthrough

Modify the `httpd.conf` file located in: `<install_dir>/var/domains/<domain_name>/configurations/<configuration_name>/mos/<apache_ManagedObject_name>/conf` by un-commenting the `sslOptions +StdEnvVars +ExportCertData` directive in the `mod_ssl` section. For example:

```
<IfModule mod_ssl.c>
BrowserMatch ^Mozilla/[2345] nokeepalive
SSLEngine on
SSLRandomSeed startup builtin
SSLRandomSeed connect builtin
SSLCertificateFile C:\BDP(b414)\var\domains\base\configurations\j2eeSample/mos/
ApacheWebServer/conf/ssl.crt/server.crt
SSLCertificateKeyFile C:\BDP(b414)\var\domains\base\configurations\j2eeSample/
mos/ApacheWebServer/conf/ssl.key/server.key

# Uncomment the following to enable SSL certificate and related information to
be exported to the apache environment

#SSLOptions +StdEnvVars +ExportCertData

</IfModule>
```

Configuring the mod_iiop IIOP connector of the httpd.conf file to forward SSL authentication

As part of the certificate passthrough feature, a new IIOP configuration directive has been added. The `IIopEnableSSLExport` directive instructs the IIOP connector to forward SSL requests.

If the `IIopEnableSSLExport` directive is enabled and a client request is set as secure (has a type of `https`), then the IIOP connector will attempt to locate a set of environment variables. If a set of environment variables are found, then the IIOP connector forwards the data on to the Borland web container as part of the request.

Modify the `httpd.conf` file located in: `<install_dir>/var/domains/<domain_name>/configurations/<configuration_name>/mos/<apache_ManagedObject_name>/conf` by un-commenting the appropriate directives, shown here:

```
<IfDefine !ModIIOPNoAutoLoad>
LoadModule iiop2_module C:/BDP(b414)/lib/<apache_ManagedObject_name>/
mod_iiop2.dll
IIopLogFile C:\BDP(b414)\var\domains\base\configurations\j2eeSample/mos/
ApacheWebServer/logs/mod_iiop.log
IIopLogLevel error
IIopClusterConfig C:\BDP(b414)\var\domains\base\configurations\j2eeSample/mos/
ApacheWebServer/conf/WebClusters.properties
IIopMapFile C:\BDP(b414)\var\domains\base\configurations\j2eeSample/mos/
ApacheWebServer/conf/UriMapFile.properties

# Directive: IIopLookupLocalRefs true | false
# Purpose: Allows apache to override the UriMapFile mapping if the reference is
found in the local doc tree.
# Default: false - by default mod_iiop2 will not look for local references
prior to dispatching a matching reference to
#    tomcat.
#
#IIopLookupLocalRefs true
#
#
# Directive: IIopChunkedUploading  true | false
# Purpose: Determines whether mod_iiop2 will attempt to chunk POSTed data
(uploads). Corresponds to the enabledChunking attribute of the Borland
WebContainer's IIOP connector.
# Default: false - Mod_iiop2 will not attempt to chunk uploaded data.
#
#IIopChunkedUploading true
#
# Directive: IIopUploadBufferSize n

# Purpose: Allows mod_iiop to control the size of the 'chunk; of data POSTed to
the Borland WebContainer as part of a chunked upload.  This directive is
ignored if IIopNoChunkedUploading is set to true.
# Default: 4096
#
#IIopUploadBufferSize 4096
#
# Directive: IIopReapIdleConnections n

# Purpose: Directs the VisiBroker orb to attempt to reap 'n' idle connections
from the orb connection pool after every HTTP request. This can improve
performance on systems that have limited network resources.
```

```
# Default: none - by default mod_iiop2 does not request the orb to reap idle
connections.
#
#IIopReapIdleConnections 50

# uncomment the following to enable the "certificate passthrough" feature of
the IIOP connector
# Note: you must have already un-commented the SSLOptions directive of the
mod_ssl module earlier

#IIopEnableSSLExport true

</IfDefine>
```

Security for the Borland web container

In order to protect access to your web resources, you must secure those resources. The following steps are required for securing web resources using VisiBroker:

1 Set up security for your Borland web container

2 Set up security for each web application

Securing your Borland web container

By default, the Borland web container is set up to use the Borland Security Service Realm (`BSSRealm`). To secure your Borland web container, you need to complete the following:

1 Enable security

2 Configure Security authentication

3 Configure Security authorization

Securing your web application

The VisiBroker Server allows you to set security for each of your web applications by protecting the URLs with which the application's resources are associated. To secure a web application, you must first decide which URLs you want to protect. Once you protect a URL, a user is not able to access it without entering a valid user name and password.

Once you identify a web resource collection (servlets, JSPs, HTMLs, Gifs, and such) and the associated URLs your want to protect, the steps to securing the web application are:

1 Define new security roles: Assign users to a security role which is used to determine who accesses the web resources and what actions are allowed when using the web resources by way of a web browser.

2 Define the security constraints for the specific web resource files: Protect the URL Patterns that map to certain servlets and JSPs.

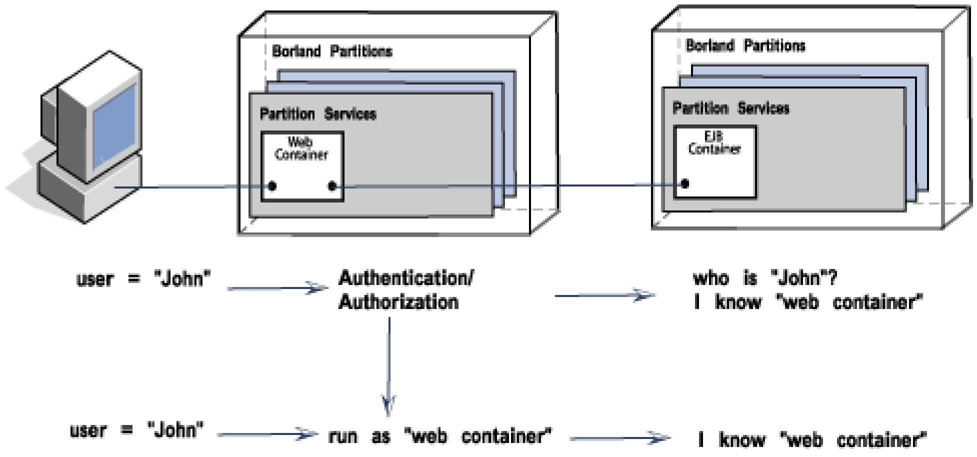
3 Set up a login: Set the login option which controls the access to the servlets and JSPs through their URL patterns.

For example, you may set up a “Developer” security role that can access the web resources of the `example.war` file which contains the URL Pattern, `jsp/security/servlet/*.jsp`.

Three-tier authorization scheme

In addition to setting up security from your client browser to your Borland web container, you can set up a three-tier authorization scheme to accommodate a more complex client/server landscape. A three-tier authorization scheme can include a client browser, a web container, and an EJB container.

Figure 8.1 Three-tier authorization scheme



The server-side has two different container components with a security mechanism in each of them. So, when a user (John) sends a client request, his login ID is authorized and authenticated at the Borland web container level.

Lets say that the client request requires the servlet running at the Borland web container to access a bean in the EJB container. However, the EJB container does not know the user, “John”. You have two options for extending security to the EJB container.

- The first is to make the EJB container knowledgeable of all users.
- The second is to use the concept of “run-as”—When the web container makes an EJB invocation, the web container will “run as” a user that the EJB container recognize. The web application can be configured with a “run as” user to access the third-tier component. The web application with the servlet making the EJB invocation can be configured with “run as” user “web container”. In this case, though the real user is “John”, the EJB container acknowledges the user as “web-container”.

Setting up “run-as” role

The Borland web container, supports the “run-as” configuration for web applications. The web application can be set up with the “run-as” role which maps to a user.

To set up the “run as” configuration:

1. Open the `.war` file in the DDEditor.
2. In the Navigation pane, expand the `.war` file.
3. Select a servlet node.
4. Access the Properties pane, General tab.

5 In the Security Identity field, choose Run as from the drop-down menu.

6 In the Run section that appears, use the Descriptions field to type a short description of the Run as.

7 In the Role field, use the pull-down menu to select the appropriate role from the list.

Note In addition to setting the “run-as” role, you also must set a principal to map to the “run as” role. For more information, see “Authorization domains” on page 46.

Chapter

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Security Properties for Java

Property	Description	Default
vbroker.security.logLevel	Use this property to control the degree of logging. 0 means no logging and 7 means maximum logging (debug messages).	0
vbroker.security.secureTransport	This property controls whether the transport connection is encrypted or not. If set to true, transport messages are encrypted. If set to false they are in the clear.	true
vbroker.security.alwaysSecure	This property together with the secureTransport property controls the default QoP on the client-side. If both set to true then transport QoP is set to SECURE_ONLY, which means the client will only accept secure transport. If either of them is set to false then Client does not mandate security at the transport layer.	false
vbroker.security.server.transport	This property is used on the server side to define server transport QoP. Acceptable values are CLEAR_ONLY, SECURE_ONLY or ALL. This allows the client that needs either CLEAR_ONLY or SECURE_ONLY to be able to connect to a server. This property will take effect only when property secureTransport is true.	SECURE_ONLY
vbroker.security.disable	If set to true, disables all security services.	true
vbroker.security.transport.protocol	This property is used to select a security transport protocol. Possible values are SSL, SSLv2, SSLv3, TLS and TLSv1. For information on these protocols, see the Sun Microsystems documentation at: http://java.sun.com/products/jsse/doc/guide/API_users_guide.html#SSC.	TLSv1
vbroker.security.requireAuthentication	Server-side only property used to specify whether the client is required to authenticate.	false
vbroker.security.enableAuthentication	Server-side only property. This back-compatible property is used for supporting PasswordBackEnd style authentication. When set to true, the program will try to construct the specified PasswordBackEnd for authenticating.	false
vbroker.security.authentication.callbackHandler	Specifies the callback handler used for login modules to use for interacting with user for credentials. You can specify one of the following or your own custom callback handler: com.borland.security.provider.authn.CmdLineCallbackHandler com.borland.security.provider.authn.HostCallbackHandler CmdLineCallbackHandler has password echo on, while HostCallbackHandler has password echo off.	n/a

Property	Description	Default
vbroker.security.authentication.config	This specifies the path to the configuration file used for authentication.	null
vbroker.security.authentication.retryCount	Number of times to retry if remote authentication failed.	3
vbroker.security.authentication.clearCredentialsOnFailure	By default, if the authorization realm finds the authenticator is incorrect after the maximum number of retries have been attained, the ORB retains the authenticator. If you want the ORB to clear the authenticator (the credential) after the maximum number of retries, set this property to true.	false
vbroker.security.login	If set to true, at initialization-time this property tries to login to all the realms listed by property vbroker.security.login.realms.	false
vbroker.security.login.realms	This gives a list of comma-separated realms to login to. This is used when login takes place, either through property vbroker.security.login (set to true) or API login using login().	n/a
vbroker.security.vault	This property is used to specify the path to the vault file. This property will take effect regardless of whether vbroker.security.login is set to true or false.	n/a
vbroker.security.identity.reauthenticateOnFailure	When set to true the security service will attempt to reacquire authentication information using the CallbackHandler. This property require the callback handler to be set either using the appropriate property or at runtime by calling the appropriate method.	false
vbroker.security.identity.enableReactiveLogin	When set to true, the security service behaves as follows: If the security service cannot find an identity for any of the targets supported by a server it is attempting to communicate with, it will then attempt to acquire credentials for one of the targets in the target object's IOR. If a corresponding authentication realm is available for this target (that the user chooses to provide credentials for), then authentication is also attempted locally. Reactive login requires a callback handler to be set either using the appropriate property or at runtime by calling the appropriate method.	true
vbroker.security.authDomains	Specifies a comma-separated list of available authorization domains. For example: `vbroker.security.authDomains=<dom1>,<doma2>...`	null
vbroker.security.domain.<domain_name>.rolemap_path	Specifies the location of the RoleDB file that describes the roles used for authorization. This is scoped within the domain <domain_name> specified in vbroker.security.authDomains.	n/a
vbroker.security.domain.<domain_name>.rolemap_enableRefresh	When set to true, enables dynamic loading of the RoleDB file specified in vbroker.security.domain.<domain_name>.rolemap_path property. The interval of dynamic loading is specified by property vbroker.security.domain.<domain_name>.rolemap_refreshTimeInSeconds.	false
vbroker.security.domain.<domain_name>.rolemap_refreshTimeInSeconds	Specifies the rolemap refresh time in seconds.	300
vbroker.security.domain.<domain name>.runas.<run_as_role_name>	Specifies the name of the run-as role. The value can be either use-caller-identity to have the caller principal be in the run-as role, or specify an alias for a run-as principal for the run-as role name.	n/a
vbroker.security.peerAuthenticationMode	Sets the peer authentication Mode. Possible values are: REQUIRE REQUIRE_AND_TRUST REQUEST REQUEST_AND_TRUST NONE Note that the REQUEST and REQUEST_AND_TRUST modes cannot receive peer certificate chains due to JSSE restrictions.	NONE

Property	Description	Default
vbroker.security.trustpointsRepository	Specifies a path to the directory containing trusted certificates and CRLs or to a trusted Keystore whose values are implementations of TrustedCertificateEntry. Default values are either a directory, given in the format Directory:<path_to_certs> or a Keystore, given in the format Keystore:<path_to_keystore>.	n/a
vbroker.security.defaultJSSETrust	If set to true, the JSSE default trust files like cacerts and jssecacerts, if present in JRE, will be used to load trusted certificates.	false
vbroker.security.assertions.trust.<n>	This property is used to specify a list of trusted roles (specified with the format <role>@<authorization_domain>). <n> is a uniquely identified for each trust assertion rule as a list of digits. For example, setting vbroker.security.assertions.trust.1=ServerAdmin@default means this process trusts any assertion made by the ServerAdmin role in the default authorization domain.	n/a
vbroker.security.assertions.trust.all	Setting to true will trust all the assertion made by peers.	false
vbroker.security.server.requireUPIdentity	Set this to true if the server requires the client to send a Username/Password for authentication (regardless of certificate-based authentication). This is a server-side property.	n/a
vbroker.security.cipherList	Set this to a list of comma-separated ciphers to be enabled by default on startup. If not set, a default list of ciphersuites will be enabled. These should be valid SSL Ciphers.	n/a
vbroker.security.controlAdminAccess	Set this to true for enabling Server Manager operations on a Secure Server.	false
vbroker.security.serverManager.authDomain	Points to a security domain listed in vbroker.security.authDomains. The specified domain is used for the Server Manager's role-based access control checks. A rolemap must be specified for the domain.	n/a
vbroker.security.serverManager.role.all	Specifies the role name required for accessing all Server Manager operations.	n/a
vbroker.security.serverManager.role.<method_name>	Specifies the role name required for accessing the specified method of the Server Manager.	n/a
vbroker.security.support.gatekeeper.replyForSAS	This property is used with GateKeeper with security enabled. When set to true, the username and password will not be delegated to the backend server for authentication.	false
vbroker.security.domain.<domain_name>.defaultAccessRule	Specifies whether to grant or deny access to the domain by default in the absence of security roles for the provided domain. Acceptable values are grant or deny.	grant
vbroker.se.iiop_tp.scm.ssl.listener.trustInClient	A server side property. Set to true to have the server require certificates from the client. These certificates must also be trusted by the server by setting the appropriate server-side trust properties. For more information, see the vbroker.security.trustpointsRepository property and the vbroker.security.defaultJSSETrust property.	false
vbroker.security.wallet.type	A wallet is a set of directories containing encrypted private keys and certificate chains for each identity. Use this property to point to the directory containing the directories for all identities, using the format: Directory:<path_to_identities>	n/a
vbroker.security.wallet.identity	Use to point to a directory within the path defined in vbroker.security.wallet.type that contains keys and/or certificate information for a specific identity. Note that the value of this property must consist only of lower-case letters.	n/a
vbroker.security.wallet.password	Specifies the password used to decrypt the private key or the password associated with the login.	n/a

Chapter

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Security Properties for C++

Property	Description	Default
`vbroker.security.logLevel`	Use this property to control the degree of logging. Acceptable values are: `LEVEL_WARN`, `LEVEL_NOTICE`, `LEVEL_INFO`, and `LEVEL_DEBUG` strings.	`LEVEL_WARN`
`vbroker.security.logFile`	Use this property to redirect the log output to a file. The default log output is to `std::cerr`.	null
`vbroker.security.secureTransport`	This property sets whether secure transport is supported or not. If set to `false`, transport uses `CLEAR_ONLY`.	`true`
`vbroker.security.alwaysSecure`	This is a client side only property. It determines whether to use secure transport only or not. **Note:** To use secure transport only, the `secureTransport` property must also be set to `true`.	`true`
`vbroker.security.server.transport`	This is a server side only property. It defines whether the server transport is: `CLEAR_ONLY`, `SECURE_ONLY` or `ALL`. This property will not take effect when the `secureTransport` property is set to `false`.	`SECURE_ONLY`
`vbroker.security.disable`	If set to `true`, disables all security services.	`false`
`vbroker.security.requireAuthentication`	A server side only property. Use to specify whether the client is required to authenticate.	`true`

`vbroker.security.authentication.callbackHandler`	Specifies the callback handler for login modules to use for interacting with the user for credentials. You can specify one of the following or your own custom callback handler. For more information, see Chapter 11, "VisiSecure for C++ APIs."
	`com.borland.security.provider.authn.CmdLineCallbackHandler`
	`com.borland.security.provider.authn.HostCallbackHandler`
	`CmdLineCallbackHandler` has password echo on, while `HostCallbackHandler` has password echo off.
		`HostCallbackHandler`

`vbroker.security.authentication.config`	This specifies the path to the configuration file used for authentication.	null
`vbroker.security.authentication.retryCount`	Number of times to retry if remote authentication failed.	`3`
`vbroker.security.login`	If set to `true`, at initialization-time this property tries to login to all the realms listed by property `vbroker.security.login.realms`.	`true`

Property	Description	Default
vbroker.security.login.realms	This gives a list of comma-separated realms to login to. This is used when login takes place, either through property vbroker.security.login (set to true) or API login.	n/a
vbroker.security.vault	This property is used to specify the path to the vault file. This property will take effect regardless of whether vbroker.security.login is set to true or false.	n/a
vbroker.security.identity.reactiveLogin	When set to true, the security service behaves as follows. If the security service cannot find an identity for any of the targets supported by a server it is attempting to communicate with, it then attempts to acquire credentials for one of the targets in the target object's IOR. If a corresponding authentication realm is available for this target (that the user chooses to provide credentials for), then authentication is also attempted locally. Reactive login requires a callback handler to be set either using the appropriate property or at runtime by calling the appropriate method. The default handler is HostCallbackHandler.	true
vbroker.security.authDomains	Specifies a comma-separated list of available authorization domains. For example: `vbroker.security.authDomains=domain1,domain2`	n/a
vbroker.security.domain.<domain-name>.rolemap_path	Specifies the location of the RoleDB file that describes the roles used for authorization. This is scoped within the domain <domain_name> specified in: vbroker.security.authDomains.	n/a
vbroker.security.domain.<domain_name>.rolemap_enableRefresh	When set to true, enables dynamic loading of the RoleDB file specified in vbroker.security.domain.<domain_name>.rolemap_path property. The interval of dynamic loading is specified by property vbroker.security.domain.<domain_name>.rolemap_refreshTimeInSeconds.	false
vbroker.security.domain.<domain_name>.rolemap_refreshTimeInSeconds	Specifies the rolemap refresh time in seconds.	300
vbroker.security.peerAuthenticationMode	Sets the peer authentication Mode. Possible values are: REQUIRE—Peer certificates are required to establish a connection. If the peer does not present its certificates, the connection will be refused. Peer certificates will also be authenticated, if not valid, the connection will be refused. If required, transport identity can be established using these certificates. In this mode, peer certificates are not required to be trusted. REQUIRE_AND_TRUST—Same as REQUIRE mode, except that the peer certificates need to be trusted, otherwise the connection will be refused. REQUEST—Peer certificates will be requested. The peer is not required to have certificates; no transport identity will be established when peer does not have certificates. However, if a peer does present certificates, the certificates will be authenticated; if not valid, the connection will be refused. If required, transport identity can be established using these certificates. In this mode, peer certificates are not required to be trusted. REQUEST_AND_TRUST—Same as REQUEST mode except that the peer certificates need to be trusted, otherwise the connection will be refused. NONE—Authentication is not required. During handshake, no certificate request will be sent to the peer. Regardless of whether the peer has certificates, a connection will be accepted. There will be no transport identity for the peer.	REQUIRE_AND_TRUST

Property	Description	Default
`vbroker.security.trustpointsRepository`	Specifies a path to the directory containing trusted certificates. These are given in the form `Directory:<certs_dir>`. For example: `vbroker.security.trustpointsRepository=Directory:c:\data\identities\Delta`	n/a
`vbroker.security.assertions.trust.<n>`	Use to specify a list of trusted roles (specify with the format `<role>@<authorization_domain>`). `<n>` is uniquely identified for each trust assertion rule as a list of digits. For example, setting `vbroker.security.assertions.trust.1=ServerAdmin@default` means this process trusts any assertion made by the `ServerAdmin` role in the `default` authorization domain.	n/a
`vbroker.security.assertions.trust.all`	Setting to `true` will trust all the assertion made by peers.	`false`
`vbroker.security.server.requireUPIdentity`	A server side only property. If the server requires the client to send a Username/Password for authentication (regardless of certificate-based authentication), set to `true`. If `vbroker.security.login.realms` is set, this property is automatically set to `true`. However, you can override it by explicitly setting it in the property file.	n/a
`vbroker.security.cipherList`	Set this to a list of comma-separated ciphers to be enabled by default on startup. If not set, a default list of cipher suites will be enabled. These should be valid SSL Ciphers.	n/a
`vbroker.security.wallet.type`	A wallet is a set of directories containing encrypted private keys and certificate chains for each identity. Use this property to point to the directory containing the directories for all identities, using the format: `Directory:<path_to_identities>`	n/a
`vbroker.security.wallet.identity`	Points to a directory within the path defined in `vbroker.security.wallet.type` that contains keys and/or certificate information for a specific identity.	n/a
`vbroker.security.wallet.password`	Specifies the password used to decrypt the private key or the password associated with the login.	n/a
`vbroker.security.CRLRepository`	Use to specify the directory where you want the list of serial numbers of revoked certificates (Certificate Revocation List (CRL)), issued by the Certificate Authority (CA), to reside. All files in the directory will be loaded and interpreted as CRL—no longer valid. The CRL file must be in the DER format. Once the CRLs are loaded, VisiSecure examines all certificates sent by a peer during SSL handshake. If any of the peer certificates appears in the CRLs, an exception will be thrown and the connection will be refused. For more information, see "Certificate Revocation List (CRL) and revoked certificate serial numbers" on page 16.	n/a

Chapter

11

VisiSecure for C++ APIs

This section describes APIs that are defined in VisiSecure for C++. It is separated into subsections including:

- General APIs
- SSL and Certificate APIs
- QoP APIs
- Authorization APIs

All classes are under namespace `vbsec` unless otherwise specified.

General API

The general VisiSecure API describes the `Current` and `Context` APIs. It provides API information for Principals, Credentials, and Subjects. In addition, the `Wallet` API is discussed.

class vbsec::Current

Current represents the view to the thread specific security context. Some calls are relevant only in an request execution context. This object can be obtained through the following code:

```
CORBA::Object_var obj = orb->resolve_initial_references("VBSecurityCurrent");
Current* c = dynamic_cast(obj.in());
```

Include File

The `vbsec.h` file should be included when you use this class.

Methods

```
void asserting (const vbsec::Subject* caller)
```

Assert a subject as caller identity.

Parameter	Description
caller	The caller name of the subject.

```
void clearAssertion ()
```

Clear an assertion made by any previous API call of `asserting`. The caller before the assertion is made will be restored as the caller for next invocation. This API shall be used in conjunction with `asserting`. Mismatching calls of these two methods may cause undesired caller identities or unexpected exceptions.

```
const vbsec::Subject* getPeerSubject ()
```

Accesses the peer subject.

Returns The pointer to a Subject object representing the peer.

```
const vbsec::Subject* getCallerSubject ()
```

Accesses the caller subject.

Returns The pointer to a Subject object representing the caller.

```
const vbsec::SSLSession* getPeerSession (CORBA::Object* peer)
```

Get the peer `SSLSession`. This call returns the `SSLSession` of the client peer for this request. This method cannot be called outside the context of a request.

Parameter	Description
peer	A peer object retrieved from the bind.

Returns The pointer to a SSLSession currently established.

Exceptions `BAD_OPERATION` is thrown if this method is called outside the context of a request or when called in a request context where the request was received over a clear TCP connection.

class vbsec::Context

`Context` represents the security context under which a client will execute. This class can be obtained through the following code:

```
CORBA::Object_var obj = orb->resolve_initial_references("VBSecurityContext");
Context* c = dynamic_cast(obj.in());
```

Include File

The `vbsec.h` file should be included when you use this class.

Methods

```
void login()
```

Login into the system. This logs-in to the realms defined in the property `vbroker.security.loginRealms`. It traverses the list of realms specified and authenticates against each realm.

```
void login (vbsec::CallbackHandler& handler)
```

Use this to login to the system using the specified `CallbackHandler` to obtain the login information.

Parameter	Description
handler	The default callback handler to be use for acquiring information.

```
void login (const std::string& realm)
```

Login into the system for a specific realm.

Parameter	Description
realm	The realm to login to.

```
void login (const std::string& realm, vbsec::CallbackHandler& handler)
```

Login into the system for a given realm, using a given callback handler for acquiring information.

Parameter	Description
realm	The realm to login to.
handler	The default callback handler to be use for acquiring information.

```
void login (const vbsec::Wallet& wallet)
```

Login into the system with a `wallet`. Wallet can be created using `WalletFactory` API.

Parameter	Description
wallet	The wallet to be used for login.

```
void login (const std::vector<const vbsec::Wallet*>& wallet)
```

Login into the system with a set of wallets specified as a vector.

Parameter	Description
wallet	A wallet to be used for login

```
const vbsec::Subject* getSubject (const std::string& realm)
```

Gets the `Subject` corresponding to a given realm.

Parameter	Description
realm	The Realm for the Principal

Returns A pointer to the `Subject` object representing the subject of the realm.

```
void loadVault (std::istream& stream, const CSI::UTF8String& vaultPass)
```

Loads a given vault. The identities in the vault are loaded into the system. No login required when this method is used.

Parameter	Description
stream	Stream that the vault information will be read from, in binary format.
vaultPass	Password used to decrypt the vault information.

```
void logout()
```

Log the user out from all the realms.

```
void logout (const std::string& realm)
```

Log the user out from a given realm.

Parameter	Description
realm	The realm to logout from.

```
void setCallbackHandler (vbsec::CallbackHandler* handler)
```

Set the default callback handler programmatically. This is similar to using the property `vbroker.security.authentication.callbackHandler`.

Parameter	Description
handler	The `CallbackHandler` to be set.

```
void generateVault( std::ostream& stream, const CSI::UTF8String& password)
```

Generates a vault. The vault is written out to the stream that is passed in and encrypted using the password provided (also used to decrypt the vault). The password may be null. The vault contains all of the system's identities.

Parameter	Description
stream	The stream that the vault information will be written into, in binary format.
password	The password used to encrypt the vault information.

```
vbsec::Subject* authenticateUser (const vbsec::Wallet& wallet)
```

Authenticate the given wallet credential. The login will be performed using the wallet but the authenticated subject will not be used as one of the system identities.

Parameter	Description
wallet	The wallet to be used for authentication

```
vbsec::Subject* importIdentity (const vbsec::Wallet& wallet)
```

Import a subject using the given wallet credential. No login is required with this method. The subject will not be used as one of the system identities.

Parameter	Description
wallet	The wallet corresponding to the identity to be imported.

```
void setPRNGSeed (const CORBA::OctetSequence& seed)
```

Sets a seed for the pseudo-random generator used by the SSL layer.

Parameter	Description
seed	The seed for the PRNG.

```
ssl::CipherSuiteInfoList* listAvailableCipherSuites()
```

Get the list of cipher suites that are available for use with the SSL layer. Note that this is different from the `getEnabledCipherSuites` call in that not all the **available** cipher suites may be currently enabled.

Returns List of cipher suits that are available but may not be enabled for use with the SSL layer.

```
void enableCipherSuites (const ssl::CipherSuiteInfoList& suites)
```

Sets the cipher suites that should be enabled for all SSL sessions.

Parameter	Description
suites	An IDL-generated `CipherSuiteInfoList` type.

```
ssl::CipherSuiteInfoList* getEnabledCipherSuites()
```

Gets the set of cipher suites that are currently enabled for all SSL sessions.

Returns Cipher suits that are currently enabled for all SSL sessions.

```
void setSSLContext (vbsec::VBSSLContext* ctx)
```

Sets the SSL context. This will allow establishing of an SSL session using the information defined in `VBSSLContext`. A `VBSSLContext` can be created using the `SecureSocketProvider` API.

Parameter	Description
ctx	The `VBSSLContext` that is to be used for any SSL session establishment.

```
VBSSLContext& getSSLContext()
```

Get the `VBSSLContext` that is set using the `setSSLContext()` or return a default `VBSSLContext` object.

Returns The `VBSSLContext` that will be used for any `SSLSession` establishment.

class vbsec::Principal

Principal represents the identity of a user. This is a virtual class.

Include file

The `vbsec.h` file should be included when you use this class.

Methods

```
std::string getName() const
```

Returns The name of the Principal.

```
std::string toString() const
```

Get the string representation of the Principal.

Returns The string representation of the Principal.

class vbsec::Credential

Credential represents the information used to authenticate an identity, such as user name and password. This is a virtual class.

Include File

The `vbsec.h` file should be included when you use this class.

class vbsec::Subject

Subject represents a grouping of related information for a single entity, such as a person. Such information includes the Subject's identities as well as its security-related attributes (passwords and cryptographic keys, for example).

Include File

The `vbsec.h` file should be included when you use this class.

Methods

```
Principal::set& getPrincipals()
```

Gets the principals in the subject.

Returns The set of the principals in the subject. Modifying the content of the set will have no effect on the subject.

```
void clearPrincipals()
```

Clears the principals from the subject. All principals in the subject are removed.

```
Credential::set& getPublicCredentials()
```

Get the public credentials in the subject—public keys for example.

Returns The set of the public credential in the subject. Modifying the content of the set will have no effect on the subject.

```
void clearPublicCredentials()
```

Clear the public credentials in the subject. All public credentials in the subject will be destroyed and removed.

```
Credential::set& getPrivateCredentials()
```

Get the private credentials in the subject—private keys for example.

Returns The set of the private credential in the subject. Modifying the content of the set will have no effect on the subject.

```
void clearPrivateCredentials()
```

Clear the private credentials in the subject. All private credentials in the subject will be destroyed and removed.

```
Principal::set getPrincipals (const type_info& info) const
```

Gets a set of principals in the subject which have the same runtime type information as provided.

Parameter	Description
info	The runtime type information that the returned principals shall have.

Returns A set of the principals in the subject which have same runtime information as the given one. Modifying the content of the set will have no effect on the subject.

```
Credential::set getPublicCredentials (const type_info& info) const
```

Get set of public credentials in the subject which have the same runtime type information as provided.

Parameter	Description
info	The runtime type information that the returned public credential shall have.

Returns A set of the public credential in the subject which have same runtime information as the given one. Modifying the content of the set will have no effect on the subject.

```
Credential::set getPrivateCredentials (const type_info& info) const
```

Get set of private credentials in the subject which have the same runtime type information as provided.

Parameter	Description
info	The runtime type information that the returned private credentials shall have.

Returns A set of the private credentials in the subject which have same runtime information as the given one. Modifying the content of the set will have no effect on the subject.

class vbsec::Wallet

A `Wallet` is a holder of credentials usually used in login API calls. A `Wallet` can be created using `WalletFactory` APIs and contain multiple types of credentials.

Include File

The `vbsec.h` file should be included when you use this class.

Methods

```
std::string getTarget () const
```

Get the target to which wallet authenticates.

Returns The string representation of the target information.

```
void populateSubject (Subject& subject)
```

Populate the given subject with necessary credentials or other information for authentication.

Parameter	Description
subject	The subject for the wallet to populate.

class vbsec::WalletFactory

WalletFactory is a factory class to create multiple types of wallets.

Include File

The `vbsec.h` file should be included when you use this class.

Methods

```
Wallet* createCertificateWallet (const std::string& name,
                                 const std::string& password,
                                 const std::string& alias,
                                 const std::string& keypassword,
                                 short usage)
```

Create a certificate wallet using a C++ keystore. The C++ keystore is similar to the Java keystore but is implemented using a directory structure. When logging in with a wallet created by this API, the certificate chain will be used in the SSL layer.

Parameter	Description
name	The directory name of the keystore.
password	The password for the keystore, **not used for this release**.
alias	The alias to be used in the keystore.
keypassword	The password for the private key of the given alias.
short usage	The usage of the certificate information, `CLIENT`, `SERVER` or `ALL`.

Returns Certificate wallet that contains the given information.

```
Wallet* createCertificateWallet (const CORBAsec::X509CertList& chain,
                                 const CORBAsec::ASN1Object& privkey,
                                 const CSI::UTF8String& password)
```

Create a certificate wallet using a certificate chain, private key and password.

Parameter	Description
chain	The certificate chain to create the wallet.
privkey	The private key of the certificate chain.
password	The password for the private key.

Returns Certificate wallet that contains the given information.

```
Wallet* createIdentityWallet (const std::string& username,
                              const std::string& password,
                              const std::string& realm)
```

Create a identity wallet using a username, password and realm that the wallet to which the wallet authenticates.

Parameter	Description
username	The username of the identity.
password	The password for the identity.
realm	The realm to which the wallet authenticates.

Returns Identity wallet that contains the given information.

```
Wallet* createIdentityWallet (const std::string& username,
                              const std::string& password,
                              const std::string& realm,
                              const std::vector<std::string>& groups)
```

Create a identity wallet using a username, password, realm to which the wallet authenticates, and a set of group attributes.

Parameter	Description
username	The username of the identity.
password	The password for the identity.
realm	The realm to which the wallet authenticates.
groups	A set of group attributes to which the identity belongs.

Returns Identity wallet that contains the given information.

SSL API

This section explains the various SSL APIs that interact with VisiSecure's SSL implementation.

class vbsec::SSLSession

`SSLSession` represents the session of the current SSL connection. The `SSLSession` can be gotten from `vbsec::Context using getPeerSession()`.

Include File

The `vbssp.h` file should be included when you use this class.

Methods

```
time_t getEstablishmentTime() const
```

Get the time when the SSL connection was established.

Returns The time when the SSL connection was established.

```
const ssl::CipherSuiteInfo& getNegotiatedCipher() const
```

This method returns the negotiated cipher from the peer for a given SSL connection.

Returns The negotiated cipher from the peer for a given SSL connection.

```
const CORBAsec::X509CertList& getPeerCertificates() const
```

Get the certificate chain of the peer.

Returns Peer certificate chain.

```
const CORBAsec::X509Cert* getTrustpoint() const
```

Get the trust point by which the peer is trusted. Null will be returned if peer does not have certificates or its certificates are not trusted.

Returns The trust point by which the peer is trusted, or null if not.

```
char* getPeerAddress() const
```

Get the IP address of the peer.

Returns Peer IP address in a string with the following format: xxx.xx.xx.xx.

```
CORBA::UShort getPeerPort() const
```

Returns the peer port number used by this connection.

Returns The port number of the peer on the connection.

```
void prettyPrint (std::ostream& os) const
```

Print the SSLSession information into the given output stream.

Parameter	Description
os	The output stream to print the SSLSession information.

class vbsec::VBSSLContext

`VBSSLContext` contains information needed to establish an `SSLSession`. This object is created using `SecureSocketProvider::createSSLContext()`.

Include File

The `vbssp.h` file should be included when you use this class.

Methods

```
const CORBAsec::X509CertList& getCertificates() const
```

Get the certificate chain representing the identity to be used for the SSL layer.

Returns The certificate chain representing the identity to be used for the SSL layer.

```
void setCipherSuiteList (const ssl::CipherSuiteInfoList& list)
```

This method is used to specify the ciphers available for the SSL connections.

Parameter	Description
list	A list of ciphers that should be available for the SSL connections.

```
const ssl::CipherSuiteInfoList& getCipherSuiteList() const
```

Return the ciphers that are currently used by the SSL layer.

Returns The ciphers that are currently used by the SSL layer.

```
void addTrustedCertificate (const CORBAsec::X509Cert_var& trusted)
```

Programmatically add trusted certificate into the SSL context.

Parameter	Description
trusted	Certificate that is to be trusted.

```
CORBAsec::X509CertList* getTrustedCertificates() const
```

Get list of certificates that are trusted.

Returns List of certificates that are trusted.

class ssl::CipherSuiteInfo

CipherSuiteInfo is a structure containing two fields:

- `CORBA::ULong SuiteID`
- `CORBA::String_var Name`

This IDL structure contains two fields which describe ciphers according to the SSL specification. The list of `SuiteID` values and their names is in the include file, `ssl_c.h`.

Include File

The `ssl_c.hh` file should be included when you use this class.

class CipherSuiteName

This class provides information about the ciphers used in the Security Service.

Include File

The `csstring.h` file should be included when you use this class.

Methods

```
static const char* toString (int tag)
```

Return a standard representation of a supported SSL cipher.

Parameter	Description
tag	tag associated with the cipher name.

Returns Returns a stringified description of the cipher.

```
static const int fromString (char* description)
```

Give the tag associated to the given cipher description.

Parameter	Description
description	The stringified description of the cipher.

Returns The tag associated with the cipher name provided as the argument.

class vbsec::SecureSocketProvider

A `SecureSocketProvider` is the provider for secure socket connections. It provides the function of creating the SSL context, handling SSL certificates, and managing other secure socket-related information.

Include File

The `vbssp.h` file should be included when you use this class.

Methods

```
vbsec::VBSSLContext* createSSLContext (const CORBAsec::X509CertList& chain,
                                       const CORBAsec::ASN1Object& privkey,
                                       const CSI::UTF8String& password)
```

This method create a SSL context using the given information. The SSL context can then be passed into `vbsec::Context` and used to establish an SSL connection.

Parameter	Description
chain	The certificate chain
privkey	The private key object.
password	The password for the private key.

Returns `VBSSLcontext` containing the given information.

```
void setPRNGSeed (const ssl::Current::PRNGSeed& seed)
```

Sets a seed for the pseudo-random number generator used by the SSL layer.

Parameter	Description
seed	The seed for the PRNG.

```
const ssl::CipherSuiteInfoList& listAvailableCipherSuites() const
```

Gets the list of cipher suites that are available for use with the SSL layer. Note that this is different from the `getEnabledCipherSuites` call in that not all the available cipher suites may be currently enabled.

Returns List of cipher suits that are available but may not be enabled for use with the SSL layer.

```
const CertificateFactory& getCertificateFactory() const
```

Gets a certificate Factory.

Returns A `CertificateFactory` object.

class ssl::Current

The `ssl::Current` lets your client application or server object set its private key and offer its certificate information to its peer. This interface also lets you configure the SSL connection and associate your certificates and private key with an SSL connection.

Be aware that private keys and certificates contain header and trailer lines, which mark the beginning and end of the key or certificate. All of the methods offered by this interface for setting private keys and certificate chains require that these header and trailer lines be present. The parsing rules for these lines is:

- The recognized header line format for certificates is:

  ```
  -----BEGIN CERTIFICATE-----
  ```

- The recognized header line format for private keys is:

  ```
  -----BEGIN ENCRYPTED PRIVATE KEY-----
  ```

- All header lines must end with a new line character.
- All trailer lines must be preceded with, and end with, a newline character. PEM-style private keys have two additional header lines that other private keys do not have: Proc-Type and DEK-Info. Both of these lines must be present and they must end with new line characters.

This object can be obtained through the following code:

```
CORBA::Object_var obj = orb->resolve_initial_references("SSLCurrent");
ssl::Current_var current = ssl::Current::_narrow(obj);
```

Include File

The `ssl_c.hh` file should be included when you use this class.

Methods

```
CORBA::ULong getNegotiatedCipher(CORBA::Object_ptr peer)
```

This method returns the negotiated cipher from the peer for a given SSL connection.

Parameter	Description
peer	The peer from which you obtain the negotiated cipher.

Returns A value (tag) representing the cipher used. (Use `CipherSuiteName::toString` to get a String representation.)

Exceptions `CORBA::BAD_OPERATION` if the object is null or the connection is not using SSL.

```
CORBAsec::X509CertList_ptr getPeerCertificateChain(CORBA::Object_ptr peer)
```

This method obtains the peer's certificate chain. It is usually invoked by a client application to obtain information from a server, but a server can optionally request information from a client.

Parameter	Description
peer	The peer from which you obtain the negotiated cipher.

Returns A value representing the cipher used. (Use CipherSuiteName::toString to get a String representation.)

Exceptions `CORBA::BAD_OPERATION` if the object is null or the connection is not using SSL.

```
char* getPeerAddress(CORBA::Object_ptr peer)
```

Returns a description of the socket parameters used by this connection.

Parameter	Description
peer	The peer from which you obtain the information.

Returns Peer IP address in a string with the following format: xxx.xx.xx.xx

Exceptions `CORBA::BAD_OPERATION` if the object is null or the connection is not using SSL.

```
CORBA::Boolean isPeerTrusted(CORBA::Object_ptr peer)
```

Tests if the certificate chain of the peer is trusted—that is, if one certificate of the chain is in the trustpoint.

Parameter	Description
peer	The peer from which you obtain the information.

Returns `true` if the chain is trusted, `false` otherwise.

Exceptions `CORBA::BAD_OPERATION` if the object is null or the connection is not using SSL.

```
trust::Trustpoints_ptr Trustpoints getTrustpointsObject()
```

Returns a reference to the trustpoint repository. Use this API to access trustpoints object and set trustpoints.

Returns A reference to the trustpoint repository, which should be assigned to a `_var`.

```
void setPRNGSeed (const ssl::Current::PRNGseed& seed)
```

Sets a seed for the pseudo-random number generator used by the SSL layer.

Parameter	Description
seed	The `OctetSequence` seed for the PRNG.

```
void setPKprincipal (const CORBAsec::ASN1ObjectList chain,&
                     const CORBAsec::ASN1Object& privkey,&
                     const char* password);
```

This method is used in the client or the server to set the certificate chain and private key that must be used for the SSL connections. This is required for servers and optional for clients. Also look at the `peerAuthenticationMode` property documented in Chapter 10, "Security Properties for C++."

Parameter	Description
chain	The certificate chain.
privkey	The private key used for the SSL connection.
password	The password for the private key.

Exceptions `CORBA::BAD_PARAM` if the user name or password is null.

```
void setCipherSuiteList (const ssl::CipherSuiteInfoList& list)
```

This method is used in the client or the server to specify the ciphers available for the SSL connections.

Parameter	Description
list	A comma-separated list of cipher suites.

```
ssl::CipherSuiteInfoList* listAvailableCipherSuites()
```

Returns a list of cipher suites available in VisiSecure. You are responsible for freeing memory.

Returns A list of cipher suites.

```
ssl::CipherSuiteInfoList* getCipherSuiteList()
```

Returns the ciphers that are currently used by the SSL layer.

Returns A list of cipher suites.

```
void setP12Identity (const CORBASEC::ASN1OBJECT& pks12cert, const char*
password)
```

Parameter	Description
pks12cert	PKCS#12 formatted data.
password	The private key password.

Certificate API

This API contains classes and methods for working with certificates.

class vbsec::CertificateFactory

This is a utility class for handling of certificates and keys.

Include File

The `vbssp.h` file should be included when you use this class.

Methods

```
CORBAsec::X509CertList* importCertificateChain (const CORBAsec::ASN1ObjectList&
certs) const
```

Import the certification chain in the form of `CORBAsec::ASN1ObjectList` into `CORBAsec::X509CertList`, which could be use in `VBSSLContext`.

Parameter	Description
certs	`ASN1ObjectList` representation of the certificate chain.

Returns `CORBAsec::X509CertList` representation of the certificate chain for CORBA transportation.

```
CORBAsec::X509CertList* importCertificates (const CORBAsec::ASN1ObjectList&
certs) const
```

Import the certification list in the form of `CORBAsec::ASN1ObjectList` into `CORBAsec::X509CertList`. Certificates need not be related to each other. The original order is preserved after importing.

Parameter	Description
certs	`ASN1ObjectList` representation of certificate list

Returns `CORBAsec::X509CertList` representation of the certificate list.

```
CORBAsec::ASN1Object* importPrivateKey (const CORBAsec::ASN1Object& key) const
```

Convert the private key from BASE64 or PEM format to DER format.

Parameter	Description
key	`ASN1ObjectList` representation of private key object.

Returns DER format of the private key.

```
CORBAsec::X509CertList* importCertificateChain (const CORBAsec::ASN1Object&
pkcs12bytes,
                                              const CSI::UTF8String&
password) const
```

Imports a certificate chain from pkcs12 binary.

Parameter	Description
pkcs12bytes	`ASN1ObjectList` representation of pkcs12 binary.
password	Password for the pkcs12 binary.

Returns `CORBAsec::X509CertList` representation of the certificate chain.

```
CORBAsec::ASN1Object* importPrivateKey (const CORBAsec::ASN1Object&
pkcs12bytes,
                                 const CSI::UTF8String& password) const
```

Import private key from pkcs12 binary.

Parameter	Description
pkcs12bytes	`ASN1ObjectList` representation of pkcs12 binary.
password	Password for the pkcs12 binary.

Returns `CORBAsec::ASN1Object` representation of the private key object.

```
const CertificateFactory& printCertificate (const CORBAsec::X509Cert&
certificate, std::ostream& stream) const
```

Print out the certification information into an output stream.

Parameter	Description
certificate	certificate to be printed.
stream	stream to which to output.

Returns the `CertificateFactory`.

```
bool passwordForPrivatekey (const CSI::UTF8String& password,  const
CORBAsec::ASN1Object& privkey) const
```

Test if the given password can decrypt the given private key object.

Parameter	Description
password	The password to be tested.
privkey	The private key object to be decrypted.

Returns `true` if decryption is successful, `false` if not.

class CORBAsec::X509Cert

This class represents an X509 certificate. When a client application binds to a CORBA object, the client uses this interface to obtain the server's certificate information. The server can use this interface to obtain the client's certification information, if the client has a certificate.

Include File

The `X509Cert_c.hh` file should be included when you use this class.

Methods

```
char* getSubjectDN()
```

Returns the subject DN contained in the certificate.

Returns The subject name is returned in the following format:

```
CN=<value>, OU=<value>, O=<value>, L=<value>, S=<value>, C=<value>
```

```
char* getIssuerDN()
```

Returns the issuer DN contained in the certificate.

Returns The subject name is returned in the following format:

```
CN=<value>, OU=<value>, O=<value>, L=<value>, S=<value>, C=<value>
```

```
CORBA::OctetSequence * getSignatureAlgorithm()
```

Returns the signature algorithm used in the certificate.

Returns The signature algorithm used in the certificate.

```
CORBA::OctetSequence * getHash(CORBASEC::HashAlgorithm algorithm)
```

Returns a hash of the certificate.

Parameter	Description
algorithm	The hash algorithm. The possible values are: `CORBASec::MD5`, `CORBASec::MD2` and `CORBASec::SHA1`

Returns A hash of the certificate using the specified algorithm.

```
CORBAsec::ASN1Object_ptr getDER()
```

Returns the DER encoded form of this certificate.

Returns The ASN.1 DER encoded form of this certificate (assign to a `_var`).

```
CORBAsec::SerialNumberValue_ptr getSerialNumber()
```

Retrieves the serial number of the certificate.

Returns The serial number of the certificate.

```
CORBAsec::X509CertExtensionList_ptr getExtensions()
```

Returns all the extensions available in this certificate as a list of X509CertExtension.

Returns Returns all the extensions available in this certificate as a list of `X509CertExtension`. Or, if this certificate has no extensions, the method returns an array of length null. The extensions are not parsed.

```
CORBA::Boolean isValid (CORBA::ULong_out date)
```

Checks if a certificate date is between the valid start and end dates.

Parameter	Description
date	An out argument that is set to the expiration date of the certificate, using UNIX time format.

Returns `true` if the certificate is valid, `false` otherwise.

```
CORBA::ULong startDate()
```

Gets the date from which a certificate's validity starts.

Returns Returns an `int` representing the number of seconds from midnight, January 1st, 1970.

```
CORBA::ULong endDate()
```

Gets the expiration date of the certificate.

Returns Returns an `int` representing the number of seconds from midnight, January 1st, 1970.

```
CORBA::Boolean equals (CORBAsec::X509Cert_ptr other)
```

Compares two CORBAsec::X509Cert certificates.

Parameter	Description
other	The other certificate to compare to this certificate.

Returns Returns `true` (1UL) if the two certificates are identical; otherwise, returns `false` (0UL).

```
CORBA::Boolean isTrustpoint()
```

Checks if this certificate is a trustpoint—that is, if it is a trusted certificate

Returns If the certificate is a trustpoint, returns `true`.

class CORBAsec::X509CertExtension

This class is an IDL structure that represents an X509 certificate extension, as follows:

```
struct X509CertExtension {
long seq;
sequence<long> oid;
boolean critical;
sequence<octet> value;
};
```

Parameter	Description
seq	A unique number of the extension in the certificate.
oid	The oid of the extension.
value	The value of the extension encoded according to the format specified by the oid.

Include File

The X509Cert_c.hh file should be included when you use this class.

QoP API

The following section details the Quality of Protection API provided with VisiSecure.

class vbsec::ServerConfigImpl

`ServerConfigImpl` is the implementation of the `csiv2::ServerQoPConfig`, which is an IDL structure as follows:

```
ServerConfigImpl (
    CORBA::Boolean disable,
    CORBA::Short transport,
    CORBA::Boolean trustInClient,
    csiv2::AccessPolicyManager* access_manager,
    const CORBA::StringSequence& realms = _available,
    CORBA::Short requiredIdentityType = csiv2::ServerQoPConfig::UP_OR_PK,
    CORBA::Boolean supportIdentityAssertion = static_cast<CORBA::Boolean>(1)
);
```

Parameter	Description
disable	Whether or not to disable security.
transport	The transport mechanism to use. Valid values are: ■ `csiv2::CLEAR_ONLY`: no secure transport is necessary ■ `csiv2::SECURE_ONLY`: only secure connections are permitted ■ `csiv2::ALL`: any method of transport is allowed
trustInClient	Whether or not the target requests the client to authenticate. This value is set on CSIV2 layer.
access_manager	An access manager for the QoP implementation, an implementation of `csiv2::AccessPolicyManager` defined by the user. If null, it uses a default value.
realms	The available realms in which to implement the policy.
requiredIdentityType	The required identity for the QoP policy implementation. The default value is `csiv2::ServerQoPConfig::UP_OR_PK`. Possible values are: `csiv2:ServerQoPConfig::NO_ID`, `csiv2::ServerQoPConfig::UP`, `csiv2::ServerQoPConfig::PK`, `csiv2::ServerQoPConfig::UP_OR_PK` and `csiv2::ServerQoPConfig::UP_AND_PK`
supportIdentityAssertion	Whether or not the application supports Identity Assertion.

To define the `ServerQoPPolicy`, you create this object which defines the various characteristics of the policy.

Include File

The `CSIV2Policies.h` file should be included when you use this class.

class ServerQoPPolicyImpl

`ServerQoPPolicyImpl` is the implementation of the `csiv2::ServerQoPPolicy`. The `ServerQoPPolicyImpl` object impacts the QoP behaviour of the server.

Include File

The `CSIV2Policies.h` file should be included when you use this class.

Methods

```
ServerQoPPolicyImpl (const csiv2::ServerQoPConfig_var& conf);
```

Constructor of the `ServerQoPPolicyImpl` object.

Parameter	Description
conf	`ServerQoPConfig` object which contains the designed QoP configuration.

```
virtual csiv2::ServerQoPConfig_ptr config();
```

Get the ServerQoPConfigImpl object from the ServerQoPPolicyImpl.

Returns The `ServerQoPConfigImpl` object from the `ServerQoPPolicyImpl`.

class vbsec::ClientConfigImpl

`ClientConfigImpl` is the implementation of the `csiv2::ClientQoPConfig`. To define the `ClientQoPPolicy`, you create this object which defines the various characteristics of the policy.

Include File

The `CSIV2Policies.h` file should be included when you use this class

Methods

```
ClientConfigImpl (const CORBA::Short transport, const CORBA::Boolean
trustInTarget)
```

Constructor of ClientConfigImpl object.

Parameter	Description
transport	The transport mechanism to use. Valid values are: ■ `csiv2::CLEAR_ONLY`: no secure transport is necessary ■ `csiv2::SECURE_ONLY`: only secure connections are permitted ■ `csiv2::ALL`: any method of transport is allowed
trustInTarget	Whether or not to require the client to authenticate.

class vbsec::ClientQoPPolicyImpl

`ClientQoPPolicyImpl` is the implementation of the `csiv2::ClientQoPPolicy`. The `ClientQoPPolicyImpl` object impacts the QoP behaviour of the server.

Include File

The CSIV2Policies.h file should be included when you use this class.

Methods

```
ClientQoPPolicyImpl( const csiv2::ClientQoPConfig_var& conf);
```

Constructor for `ClientQoPPolicyImpl` object.

Parameter	Description
conf	`ClientConfigImpl` object to be use for the policy.

```
virtual csiv2::ClientQoPConfig_ptr config();
```

Returns the `ClientConfigImpl` object of this `ClientQopPolicyImpl`.

Returns The `ClientConfigImpl` object of this `ClientQopPolicyImpl`.

Authorization API

The following section describes the classes and methods used for authorization in VisiSecure.

class csiv2::AccessPolicyManager

`AccessPolicyManager` is used define your Access Policy for authorization a client's method calls.

Include File

The `CSIV2Policies.h` file should be included when you use this class.

Methods

```
char* domain()
```

Returns the authorization domain name for the `AccessPolicyManager`.

Returns The authorization domain name for the object that uses this `AccessPolicyManager`.

```
csiv2::ObjectAccessPolicy* getAccessPolicy (PortableServer_ServantBase*
servant,
                                            const PortableServer::ObjectId& id,
                                            const CORBA::OctetSequence&
adapter_id)
```

Returns the objectAccessPolicy for the servant with the `objectId` (id) and poa id.

Parameter	Description
servant	The CORBA servant object.
id	the id of the servant object.
adapter_id	The poa id of the servant object.

Returns `ObjectAccessPolicy` of the servant object.

class csiv2::ObjectAccessPolicy

This class represents the access policy from `AccessPolicyManager`.

Include File

The `CSIV2Policies.h` file should be included when you use this class.

Methods

```
CORBA::StringSequence* getRequiredRoles (const char* method)
```

Returned the list of required roles to access the method.

Parameter	Description
method	The method name of interest.

Returns A list of required roles to access the method.

```
char* getRunAsRole (const char* method)
```

Return the run-as role for the method. This method is not used in this release.

Parameter	Description
method	The method name of interest.

Returns The run-as role configured to access the method.

Chapter

12

Security SPI for C++

This section describes the Service Provider Interface (SPI) classes as defined for VisiSecure for C++. These SPI classes provide advanced security functionality and allow other security providers to plug their own implementation of security services into VisiSecure for use within the Borland Deployment Platform.

Plugin Mechanism and SPIs

VisiSecure for C++ provides interfaces for you to plug in your own security implementations. In order for the ORB to find your implementation, all plugins must use the `REGISTER_CLASS` macro provided by VisiSecure to register your classes. The name of the class must be specified in full together with its namespace upon registration. Namespace must be specified in a normalized form supported by VisiSecure, using either a '.' or '::' separated-string starting from the outer namespace. For example:

```
MyNameSpace {
  class MyLoginModule {
    ......
  }
}
```

Thus `MyLoginModule` shall be specified as either `MyNameSpace.MyLoginModule` or `MyNameSpace::MyLoginModule`.

There are six pluggable components:

- **LoginModules:** You can implement their own login models by extending `vbsec::LoginModule`. To use the login module, you need to set it in the authentication configuration file, just like any other login module.
- **Callback handlers:** You can implement their own callback by extending vbsec::CallbackHandler. To use the callback, you need to set it in the authentication configuration file, just like any other callback handler.
- **Identity adapters, Mechanism adapters, and Authentication Mechanisms:** these interfaces are provided for users to implement their own authentication mechanisms and identity interpretations. `IdentityAdaptor` is to interpret identities, `MechanismAdaptor` is a specialized identity adaptor which also changes target information. `AuthenticationMechanism` is a pluggable service to authenticate users.

To use these plug-ins, you need to set the `vbroker.security.identity.xxx` properties to define the plug-ins and their properties. For example, an identity adapter or mechanism adapter could specify:

```
vbroker.security.identity.adapters=MyAdapter
vbroker.security.adapter.MyAdapter.property1=value1
vbroker.security.adapter.MyAdapter.property2=value1
```

while an authentication mechanism would provide:

```
vbroker.security.identity.mechanisms=MyMechanism
vbroker.security.adapter.MyMechanism.property1=value1
vbroker.security.adapter.MyMechanism.property2=value2
```

The properties specified will be passed to the user plug-in during initialization as a string map. The map contains truncated key/value pair like `property1, value1`.

- **Attribute codec:** This allows you to plug in an attribute codec to encode and decode attributes in their own format. VisiSecure for C++ has one build-in codec, the ATS codec.

  To use your codec plug-in, you need to set properties to define the codecs and their properties. For example:

  ```
  vbroker.security.identity.attributeCodecs=MyCodec
  vbroker.security.adapter.attributeCodec.property1=xxx
  vbroker.security.adapter.attributeCodec.property2=xxx
  ```

  The properties specified will be passed to the user plug-in during initialization as a string map.

- **Authorization service provider:** You can plugin an authorization service for each authorization domain. VisiSecure has its default implementation, which uses the rolemap. Like the other pluggable services, you will need to define the authorization service with properties which are then passed as string maps. For example:

  ```
  vbroker.security.auth.domains=MyDomain
  vbroker.security.domain.MyDomain.provider=MyProvider
  vbroker.security.domain.MyDomain.property1=xxx
  vbroker.security.domain.MyDomain.property2=xxx
  ```

- **Trust provider:** This allows you to plug in an assertion trust mechanism. Assertion can happen in multi-hop scenario, or explicitly called through assertion API. The server can have rules to determine whether the peer is trusted to make the assertion or not. The default implementation uses property setting to configure trusted peers on the server side. During runtime, the peer must pass authentication and authorization in order to be trusted to make assertions.

  Like the other pluggable services, you will need to define the authorization service with properties which are then passed as string maps. For example:

  ```
  vbroker.security.trust.trustProvider=MyProvider
  vbroker.security.trust.trustProvider.MyProvider.property1=xxx
  vbroker.security.trust.trustProvider.MyProvider.property2=xxx
  ```

  There can be only one trust provider specified for the whole security service.

Providers

Each provider instance is created by the VisiSecure using a Java reflection API. After the instance has been constructed, the `initialize` method, which must be provided by the implementer, is called passing in a map of options specific for the implementation. The options entries are defined by the implementers of the particular provider. Users specify the options in a property file and the VisiSecure parses the property and passes the options to the corresponding provider. The following table shows the properties for plugging in different provider implementations.

Table 12.1 Settings for Security Service Provider Implementations

Module Name	Property to set	Interface to implement	Options Prefix
IdentityAdapter	vbroker.security.identity.adapters	vbsec::IdentityAdapter	vbroker.security.identity.adapter.<name>
AuthenticationMechanism	vbroker.security.identity.mechanisms	vbsec::AuthenticationMechanisms	vbroker.security.identity.mechanism.<name>
AttributeCodec	vbroker.security.identity.attributeCodecs	vbsec::AttributeCodec	vbroker.security.identity.attributeCodec.<name>
TrustProvider	vbroker.security.trustProvider	vbsec::TrustProvider	vbroker.security.trust.trustProvider.<name>

In the preceding table:

- The first column lists the provider module names.
- The second column lists the property you set to define each module. Use a comma to separate multiple modules. For example, the following property has two additional IdentityAdapter implementations installed for the ORB:

  ```
  vbroker.security.identity.adapters=ID_ADA1,ID_ADA2
  ```

- The third column gives the interface each implementation must implement. The interface defines a contract between the implementers and the core VisiSecure.
- The final column gives the options prefix for the specific module. The ORB parses the property file and passes the corresponding entries to each of the modules in the initial method as the (Map options) parameter. For example, for the `ID_ADA1 IdentityAdapter` defined in the previous example, all the entries with the `vbroker.security.identity.adapters.ID_ADA1` prefix will be passed to the initial method of `ID_ADA1` IdentityAdapter.

Providers and exceptions

During the initialization, if anything goes wrong the `initialize` method should throw an instance of `InitializationException`. For certain categories of providers, there can be multiple instances with different implementations co-existing. Each of them is identified by the name within the VisiSecure system, which is passed as the first parameter in the `initialize` method. While for some categories of providers there can be only one instance existing for the whole ORB (such as in the case of the TrustProvider, in this case, the `initialize` method has only one single parameter ?the options map.

vbsec::LoginModule

`LoginModule` serves as the parent of all login modules. User plugin login modules must extend this class. Login modules are configured in the authentication configuration file and called during the login process. Login modules are responsible of authenticating the given subject and associating relevant Principals and Credentials with the subject. It is also responsible for removing and disposing of such security information during logout.

Include File

The `vbauthn.h` file should be included when you use this class.

Methods

```
void initialize (Subject* subj=0,
                        CallbackHandler *handler=0,
                        LoginModule::states* sharedStates=0,
                        LoginModule::options* options=0)
```

This method initializes the login module.

Arguments This method utilizes the following four arguments:

- subj: the subject to be authenticated.
- handler: the callback handler to use.
- sharedStates: additional authentication state provided by other login modules. Currently not used.
- options: configuration options specified in the authentication configuration file.

Returns Void.

```
bool login()
```

Performs the login. This is called during the login process. The login module shall authenticate the subject located in the module and determine if the login is successful.

Returns `true` if the login succeeds, `false` otherwise.

```
bool logout()
```

Performs the logout. This is called during the logout process. The login module shall logout the subject located in the module and determine if the logout is successful. The login module might remove any credentials or identities that were established during login and dispose of them.

Returns `true` if the logout succeeds, `false` otherwise.

```
bool commit()
```

Commits the login. This is part of the login process, called when the login succeeds according to the configuration options specified in the pertinent login modules. The login module then associates relevant Principals and Credentials with the Subject located in the module if its own authentication attempt succeeded. Or if not, it shall remove and destroy any state was saved before.

Returns `true` if the commit succeeds, `false` otherwise.

```
bool abort()
```

Aborts the login. This is part of the login process, called when the overall login fails according to the configuration options specified in the login modules. The login module shall remove and destroy any state was saved before.

Returns `true` if the abort succeeds, `false` otherwise.

vbsec::CallbackHandler

`CallbackHandler` is the mechanism that produces any necessary user callbacks for authentication credentials and other information. Seven types of callbacks are provided. There is a default handler that handles all callbacks in interactive text mode.

Include file

The `vbauthn.h` file should be included when you use this class.

Methods

```
void handle (Callback::array& callbacks)
```

Handle the callbacks.

Arguments the array of `callbacks` to be processed.

Returns Void.

vbsec::IdentityAdapter

IdentityAdapter binds to a particular mechanism. The main purpose of an IdentityAdapter is to interpret identities specific to a mechanism. It is used to perform the decoding and encoding between mechanism-specific and mechanism-independent representations of the entities.

IdentityAdapters included with the VisiSecure

The following IdentityAdapters are provided with the VisiSecure:

- `AnonymousAdapter`, with the name "`anonymous`"
- `DNAdapter`, with the name "`DN`"
- `X509CertificateAdapter` (as an implementation of the sub-interface AuthenticationMechanism)
- `GSSUPAuthenticationMechanism` (as an implementation of the sub-interface AuthenticationMechanism)

Methods

```
Virtual void initialize (const std::string& name, ::vbsec::InitOptions&) =0;
```

This method initializes the IdentityAdapter with the given name and set of options.

Arguments This method takes the following two arguments:

- The IdentityAdapter `name`.
- A set of `InitOptions` for the specified IdentityAdapter.

Exceptions Throws InitializationException if initialization fails.

```
virtual std::string getName() const=0;
```

This returns the name of the IdentityAdapter.

Returns The name of the IdentityAdapter.

Exceptions none

```
virtual ::CSI::IdentityToken* exportIdentity(::vbsec::Subject&,
::CSI::IdentityToken&) =0;
```

Exports the identity of the IdentityAdapter as an IdentityToken.

Arguments The subject whose identity is to be exported.

Returns An IdentityToken data.

Exceptions Throws NoCredentialsException if no credentials recognized by this IdentityAdapter are found in the subject.

```
virtual void importIdentity (::vbsec::Subject&, ::CSI::IdentityToken&) =0;
```

Imports the IdentityToken and populates the caller subject with the appropriate principals associated with this identity.

Arguments The subject whose identity is to be imported.

Exceptions Throws NoCredentialsException if no credentials recognized by this IdentityAdapter are found in the subject.

```
virtual ::vbsec::Privileges* getPrincipal (::vbsec::Subject&amp;) =0;
```

Returns a Principal representing this identity. This method is used for interfacing with EJBs and servlets.

Arguments The principal subject.

Returns A principle object.

Exceptions none

```
virtual ::vbsec::Privileges* getPrivileges (::vbsec::Subect&) =0;
```

Arguments The target subject.

Returns The privilege attributes for this target subject recognized by this IdentityAdapter.

Exceptions none

```
virtual ::vbsec::setPrivileges (::vbsec::Privileges*) =0;
```

This methods sets the privilege attribute for the identity.

Arguments The privilege attribute to be set for the identity.

Exceptions none

```
virtual void deleteIdentity (::vbsec::Subject&) =0;
```

This method deletes the principals and the credentials associated with the specified target subject.

Arguments The target subject for which the principals and the credentials recognized by this IdentityAdapter are to be deleted.

Exceptions none

vbsec::MechanismAdapter

Extending from `IdentityAdapter`, a `MechanismAdapter` has the additional capability of changing the target information. This is very useful in the case where the mechanism used in a remote site is not available locally. Therefore, the local identity must be adapted before sending to the remote site.

In the out-of-box installation of VisiSecure, there is no class direct implementation of `MechanismAdapter`, while a few classes implement the sub-interface AuthenticationMechanism, which in turn gives the support of this interface.

Methods

```
virtual const ::CSI::StringOID_var getOid() const =0;
```

Returns a string representation of the mechanism OID. For example, the string representation for a GSSUP mechanism would be `oid:2.23.130.1.1.1`.

Returns The mechanism OID string.

Exceptions none

```
virtual ::vbsec::Target* getTarget (const std::string& realm, const
std::vector<AppConfigurationEntry*>&) =0;
```

Given a realm name and a list of AppConfigurationEntry objects, returns the corresponding target.

Arguments This method takes the following two arguments:

- A realm name.
- A list of `AppConfigurationEntry` objects.

Returns Returns the corresponding target object.

Exceptions none

```
virtual ::vbsec::Target* getTarget (const ::CSI::GSS_NT_ExportedName&) =0;
```

Returns a Target object representing the encoded target representation.

Arguments A Target encoded in GSS Mechanism-Independent Exported Name format (as defined in [IETF RFC2743]).

Returns A Target object.

Exceptions none

vbsec::AuthenticationMechanisms

This class represents a full-fledged mechanism which provides all the functionality needed to support an authentication mechanism in conjunction with the CSIv2 protocol.

Included with VisiSecure are the following implementations for GSSUP based and X509 Certificate based authentication mechanisms respectively:

- GSSUPAuthenticationMechanism
- X509CertificateAdapter

In addition to the methods inherited from its super interfaces, `AuthenticationMechanism` also has the following categories of methods defined.

Credential-related methods

Use these methods to acquire and/or destroy credentials.

```
virtual ::vbsec::Subject* acquireCredentials (::vbsec::Target&,
::vbsec::CallbackHandler*) =0;
```

This method acquires credentials for a given target. The credentials acquired depend on the mechanism and the information it requires for authentication.

Arguments This method takes the following two arguments:

- A Target object.
- The callback handler to be used to communicate with the user for acquiring the credentials for this Target.

Returns The Subject containing the acquired credentials (will be null in the case where the operation fails).

Exceptions none

```
virtual ::vbsec::Subject* acquireCredentials (const std::string& target,
::vbsec::CallbackHandler*) =0;
```

This method acquires credentials for a given string representation of the Target. The credentials acquired depend on the mechanism and the information it requires for authentication.

Arguments This method takes the following two arguments:

- A string representation of the Target.
- The corresponding callback handlers used to communicate with user for acquiring the credential.

Returns A subject object containing the acquired credentials (will be null in the case where the operation fails).

Exceptions none

```
virtual void destroyPrivateCredentials (::vbsec::Subject&) =0;
```

This method destroys the private credentials of the specified subject.

Arguments The subject for which the private credentials are to be destroyed.

Exceptions none

Context-related methods

```
virtual ::CORBA::OctetSeq* createInitContext (::vbsec::Subject&) =0;
```

Returns a mechanism-specific client authentication token. The token represents the authentication credentials for the specified target.

Arguments The target subject.

Returns The authentication token for the specified target subject.

Exceptions Throws NoCredentialsException if no authentication credentials recognized by this mechanism exist in this Subject.

```
virtual ::vbsec::Target* processInitContext (::vbsec::Subject&,
::CORBA::OctetSeq&) =0;
```

This method consumes the mechanism-specific client authentication token. The initial authentication token is decoded and the method populates the given subject with the corresponding authentication credentials.

Arguments The subject to be populated with authentication credentials.

Exceptions none

```
virtual ::CSI::GSSToken* createFinalContext (::vbsec::Subject&) =0;
```

This method creates a final context token to return to a client.

Arguments The Subject.

Returns A final context token.

Exceptions none

```
virtual void processFinalContext (::vbsec::Subject&, ::CORBA::OctetSeq&) =0;
```

Consumes a final context token returned by the server.

Arguments The target subject.

Exceptions none

```
virtual ::CSI::GSSToken* createErrorContext (::vbsec::Subject&) =0;
```

Creates an error context token in the case of an authentication failure.

Arguments The target subject.

Returns An error context token.

Exceptions none

```
virtual ::vbsec::Subject* processErrorContext (::vbsec::Subject&,
::CSI::GSSToken&, ::vbsec::CallbackHandler*) =0;
```

Consumes an error token returned from server. The callback handler is used to interact with a user trying to reacquire credentials. If credentials are required, the client-side security service attempts to establish the context again.

Arguments This method takes the following two arguments:

- A target subject.
- A callback handler.

Exceptions none

vbsec::Target

This class gives the runtime representation of a target authenticating principal. The context includes names for the target required in different scenarios, such as the display name, or the DER representation of the OID.

Methods

```
virtual std::string getName () const =0;
```

This method returns the display name of the target.

Returns The target name string.

Exceptions none

```
virtual ::CSI::OID getOid () const =0;
```

This method returns the target OID.

Returns The target OID string.

Exceptions none

```
virtual ::CORBA::OctetSeq getEncodedName () const =0;
```

This method returns the mechanism-specific encoding of the target name.

Returns The encoded target name.

Exceptions none

vbsec::AuthorizationServicesProvider

The implementer of the Authorization Service provides the collection of permission objects granted access to certain resources. Whenever an access decision is going to be made, the AuthorizationServicesProvider is consulted. The Authorization Service is closely associated with the Authorization domain concept. An Authorization Service is installed per each Authorization domain implementation, and functions only for that particular Authorization domain.

The `AuthorizationServicesProvider` is initialized during the construction of its corresponding Authorization domain. Use the following property to set the implementing class for the AuthorizationServicesProvider:

```
vbroker.security.domain.<domain-name>.provider
```

During runtime, this property is loaded by way of Java reflection.

Another import functionality of the Authorization Service is to return the run-as alias for a particular role given. The security service is configured with a set of identities, identified by aliases. When resources request to “run-as” a given role the AuthorizationServices again is consulted to return the alias that must be used to “run-as” in the context of the rules specified for this authorization domain.

Methods

```
virtual void initialize (const std::string& name, ::vbsec::InitOptions&
options) =0;
```

This method initializes an Authorization Services provider.

Arguments This method takes the following arguments:

- A provider name.
- The provider options.

In addition to the provider's options, the following information is passed to facilitate the interaction between this Authorization Service provider and the VisiBroker ORB:

Name	Description
`ORB`	The ORB instance used for the current system.
`Logger`	A `SimpleLogger` instance used for login in the current system.
`LogLevel`	An integer value denoting the security logging level.

Exceptions Throws InitializationException if initialization of the Authorization provider fails.

```
virtual std::string getName() const =0;
```

Returns the name for this Authorization Service implementation.

Returns The Authorization Service name.

Exceptions none

```
virtual ::vbsec::PermissionCollection* getPermissions (const ::vbsec::Resource*
resource, const ::vbsec::Privileges* callerPrivileges) =0;
```

Returns a homogeneous collection of permission attributes for the given privileges as well as the resource upon which the access is attempted.

Arguments This method takes the following two arguments:

- The caller Privileges.
- The resource object upon which access is to be attempted.

Returns A PermissionCollection object represents this subject's Permissions.

Exceptions none

vbsec::Resource

The Resource interface gives a generic abstraction of resource. The resource can be anything upon which the access will be made, such as a remote method of a CORBA object, or a servlet which is essentially a resource.

Methods

```
virtual std::string getName () const =0;
```

Returns the string representation of the resource being accessed.

Returns Name of the resource.

Exceptions none

vbsec::Privileges

The Privileges class gives an abstraction of the privileges for a subject. It is the container of authorization privilege attributes, such as Distinguished Name (DN) attributes, and such. The AuthorizationService makes the decision on whether the subject has permission to access the certain resource based on the privileges object of the subject.

The privileges object is stored inside the subject as one of the PublicCredentials. At the same time, privileges hold one reference to the referring subject. Privileges also contain a DN attributes map, as well as a map of other authorization attributes.

The Privileges class implements the `javax.security.auth.Destroyable` interface.

Constructors

```
Privileges (const std::string& name, ::vbsec::Subject& subject);
```

This constructor creates a privileges object with the given name and associates it with the given subject.

Arguments The method takes the following two arguments:

- Name of the Privileges object, which is actually the associated Subject's name.
- The target subject.

Exceptions none

Methods

```
::vbsec::Subject& getSubject() const ;
```

This method returns the subject that the privileges object represents.

Returns The target subject.

Exceptions none

```
std::string getSubjectName() const;
```

This method returns the name of the associated subject object.

Returns The target subject.

Exceptions none

```
const ::vbsec::ATTRIBUTE_MAP& getAttributes() const ;
```

This method returns the attribute map of the user.

Returns The user's attribute map.

Exceptions none

```
void setDBAttributes (const ::vbsec::ATTRIBUTE_MAP& map);
```

This method updates the DN Attributes of the user.

Arguments The new DN Attributes Map.

Note After the DN Attributes Map has been set, the Privileges object will set the underlying DN Attributes Map as unmodifiable.

Exceptions none

```
const ::vbsec::ATTRIBUTE_MAP* getDNAttributes() const;
```

This method returns the DN Attributes of the Privileges object, which can be null.

Returns User's DN Attributes map, which is not modifiable.

Exceptions none

```
bool isDestroyed() const;
```

This method checks whether the privileges object has been destroyed or not.

Returns `true|false`

Exceptions none

```
std::string toString() const;
```

This method overrides the default `toString` implementation of `java.lang.Object`, and returns “Privileges for <subject name>” information.

Returns List of privileges for each subject name.

Exceptions none

vbsec::AttributeCodec

The AttributeCodec objects are responsible for encoding and decoding privileges attributes of a given subject. This allows clients and servers to communicate privilege information to each other. Though the privilege information is used as the basis for the Authorization decision-making process, AttributeCodec selection is based on the information presented in the IOR published by the server. Inside the IOR, the server publishes information on the encoding scheme supported, while clients select an AttributeCodec that supports the given encoding.

All the AttributeCodecs implementations are registered with the IdentityServices, which is called upon during the import/export of the authorization elements process.

Methods

```
virtual void initialize (const std::string& name, vbsec::InitOptions& options)
=0;
```

This method initializes this instance of the AttributeCodec implementation. There can be multiply implementations existing in one ORB, and each is addressed internally using the name provided.

Arguments This method takes the following arguments:

- A string of AttributeCodec implementation names.
- Provider options.

For the provider's options, the following additional information is also passed during the initialization:

Name	Description
`ORB`	The ORB instance used for the current system.
`Logger`	A `SimpleLogger` instance used for the current system for the purpose of logging.
`LogLevel`	An integer value denoting the security logging level.

Exceptions Throws InitializationException if initialization of this AttributeCodec object fails.

```
virtual std::string getName() const =0;
```

This method returns the name of the provider implementation.

Returns The provider name string.

Exceptions none

```
virtual CSIIOP::ServiceConfigurationList* getPrivilegeAuthorities() const =0;
```

This method returns a list of supported privilege authorities.

Returns A list of privilege authorities.

Exceptions none

```
4. virtual CSI::AuthorizationElementType getSupportedEncoding() const = 0;
```

This method returns the supported `AuthorizationElement` type.

Returns An AuthorizationElement type.

Exceptions none

```
virtual bool supportsClientDelegation() const =0;
```

Returns whether this implementation supports ClientDelegation.

Returns `true|false`

Exceptions none

```
virtual CSI::AuthorizationToken* encode (const
CSIIOP::ServiceConfigurationList& privilege_authorities, vbsec::Privileges&
caller_privileges, vbsec::Privileges& asserter_privileges) =0;
```

This method encodes privileges as `AuthorizationElements`. This method encodes the privilege attributes of the given caller and the given asserter, if there is one. It will extract the privilege information from the subject and privilege map of the caller and the asserter.

Additionally, an implementation of the `AttributeCodec` (if supports `ClientDelegation`) may choose to verify whether the asserter is allowed to assert the caller based on the client delegation information presented by this caller.

Arguments This method takes the following arguments:

- A set of caller privileges attributes.
- A set of asserter privileges attributes.

Returns Encoded caller and asserter privileges.

Exceptions Throws NoDelegationPermissionException if the assertion is not allowed.

```
virtual void decode (const ::CSI::AuthorizationToken& encoded_attributes,
vbsec::Privileges& caller_privileges, vbsec::Privileges& asserter_privileges)
=0;
```

This method decodes authorization elements and populates the corresponding privileges objects. This is the inversion process of the encode method. When a server receives a set of encoded `AuthorizationElements`, it passes these elements to the

AttributeCodec for interpretation. Based on the encoding method, one particular `AttributeCodec` consumes the attributes it understands. It may update the caller's or asserter's Privileges, or may add `RolePermission` directly to the subject's public credentials.

Arguments This method takes the following arguments:

- A set of encoded Authorization Elements.
- A set of caller privileges.
- A set of asserter privileges.

Returns This method returns nothing. Upon a successful processing, this AttributeCode object updates the caller's or asserter's Privileges maps as appropriate based on the information available in the authorization elements.

Exceptions Throws NoDelegationPermissionException if the assertion is not authorized.

vbsec::Permission

`Permission` represents the authorization information to access resources. Every permission has a name, which can be interpreted only by the actual implementation.

Include file

The `vbsecspishared.h` file should be included when you use this class.

Methods

```
bool implies (const Permission& p) const
```

Evaluate if the permission implies another given permission. This is used during the authorization process to determine if the caller permissions imply the permissions required by the resource. Access will be granted if the caller permissions imply the required permission, or denied if not.

Arguments the permission `p` to be evaluated.

Returns `true` if the permission implies an existing permission, `false` otherwise.

```
bool operator==(const Permission& p) const
```

Checks if the permission equals another given permission.

Arguments the permission `p` to be evaluated.

Returns `true` if the permissions are equal, `false` otherwise.

```
std::string getName () const
```

Gets the name of the permission.

Returns the name of the permission.

```
std::string getActions () const
```

Get the actions of the permission as a string. It is only interpreted by the actual implementation.

Returns The string representation of the action for the permission.

```
std::string toString () const
```

Get the string representation of the permission.

Returns The string representation of the permission.

vbsec::PermissionCollection

`PermissionCollection` represents a collection of permissions.

Include file

The `vbsecspishared.h` file should be included when you use this class.

Methods

```
bool implies (const Permission& p) const
```

Evaluate if the `PermissionCollection` implies the given permission.

Arguments the permission `p` to be evaluated.

Returns `true` if the `PermissionCollection` implies the given one, `false` otherwise.

vbsec::RolePermission

The RolePermission class provides the basis for authorization and trust in the VisiSecure system.

Constructors

```
RolePermission (const std::string& role)
```

This constructor creates a RolePermission object representing a logic role.

Arguments A logical role string this RolePermission object represents.

Returns A RolePermission object.

Exceptions none

Methods

```
virtual bool implies (const Permission& permission) const;
```

This method checks whether the permission object passed in implies this RolePermission object. The check is based on strict equality, as the method only returns `true` (implies) when ALL the following conditions exist:

1 the permission object given is an instance of RolePermission, and

2 the name of the permission object given equals the name of this RolePermission.

Arguments A Permission object to check.

Returns `True|False`

Exceptions none

```
virtual std::string getActions() const;
```

This method returns the action associated with this RolePermission.

Returns Always returns null, since there are no actions associated with a RolePermission object.

Exceptions none

vbsec::TrustProvider

When a remote peer (server or process) makes identity assertions in order to act on behalf of the callers, the end-tier server needs to trust the peer to make such assertions. This is meant to prevent untrusted clients from making assertions.

The key method is `isAssertionTrusted`, which is called to determine whether the assertion is trusted given the caller subject and asserter's privileges. This method is called (by the underline implementation) after the corresponding authorization elements transmitted from a client to the server have been consumed.

You use the TrustProvider class to implement trust rules which determine whether the end-tier server accepts identity assertions from a given asserting subject. The TrustProvider class is very closely related to the implementation of the AttributeCodec objects and the privileges. For example, it is possible to provide the decision-making implementation as follows:

1. Provide class implementations representing a proxy endorsement attribute,
2. AttributeCodec implements the necessary logic then passes the attributes and imports them to the caller subject on the server-side. It is also necessary to return `true` for the method supportsClientDelegation defined in the AttributeCodec interface.
3. Provide the method implementation based on the proxy endorsement attribute of the caller and the privileges of the asserter.

This type of evaluation of trust, which is based on rules provided by the caller, is referred to as Forward Trust. Backward Trust is when the evaluation of trust is based on the rules of the target. Backward Trust is the default provided with the VisiSecure installation. For more information, see “Trust assertions and plug-ins” on page 21.

Methods

```
virtual void initialize (::vbsec::InitOptions&, std::map<std::string,
std::string>&) =0;
```

This method initializes the `TrustProvider`. There can be only one instance of the TrustProvider implementation existing for each process.

Arguments For the provider's options, the following additional information is also passed during the initialization:

Name	Description
`ORB`	The ORB instance used for the current system.
`Logger`	A `SimpleLogger` instance used for the current system for the purpose of logging.
`LogLevel`	An integer value denoting the security logging level.

Exceptions Throws InitializationException if initialization of the TrustProvider fails.

```
virtual bool isAssertionTrusted (const ::vbsec::Subject&, const
::vbsec::Privileges&) =0;
```

This method verifies whether an assertion of the caller by the asserter with the provided privileges is trusted or not. The implementation makes use of the internal trust rules for this process to determine the validity of the assertion.

Arguments This method takes the following two arguments:

- The caller.
- The set of asserter privileges.

Returns `true|false`

Exceptions none

vbsec::InitOptions

`InitOptions` is a data structure passed to user plug-ins during initialization calls that facilitates the initialization process.

Include file

The `vbsecspishared.h` file should be included when you use this class.

Data Members

```
std::map<std::string, std::string>* options
```

A string map containing name/value pair presenting parsed property setting.

```
::PortableInterceptor::ORBInitInfo* initInfo
```

Object representing the ORB initialization information.

```
::IOP::Codec* codec
```

An IOP Codec object.

```
::vbsec::SimpleLogger* logger
```

A logger object.

```
int logLevel
```

The log level currently configured for the security service.

vbsec::SimpleLogger

`SimpleLogger` is a mechanism to log information of various levels. Currently it supports four different levels: `LEVEL_WARNING`, `LEVEL_NOTICE`, `LEVEL_INFO`, and `LEVEL_DEBUG`, with increasing detailed information. There is only one logger in the whole security service.

Include file

The vbsecspishared.h file should be included when you use this class.

Methods

```
::std::ostream& WARNING()
```

Returns the logging output stream for warning messages.

Returns The logging output stream for `LEVEL_WARNING`.

```
::std::ostream& NOTICE()
```

Returns the logging output stream for notice messages.

Returns The logging output stream for `LEVEL_NOTICE`, or a fake stream if the log level is set below `LEVEL_NOTICE`.

```
::std::ostream& INFO()
```

Returns the logging output stream for info messages.

Returns The logging output stream for `LEVEL_INFO`, or a fake stream if the log level is set below `LEVEL_INFO`.

```
::std::ostream& DEBUG()
```

Returns the logging output stream for debug messages.

Returns The logging output stream for `LEVEL_DEBUG`, or a fake stream if the log level is set below `LEVEL_DEBUG`.

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