CA RiskMinder™

Installation and Deployment Guide for Unix Platforms

r3.1.01

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Chapter 1: Understanding the Basics

CA RiskMinder is an adaptive authentication solution that evaluates each online transaction (shopping, banking, or corporate access) in real time by examining a wide range of collected data against the out-of-the-box rules. It then assigns a risk score and advice to each transaction. The higher the risk score, the greater the possibility of a fraud. Based on your business policies, your application can then use this risk score and advice to approve or decline the transaction, ask for extra authentication, or alert a customer service representative.

RiskMinder is highly configurable, and offers you the flexibility to modify the configuration parameters of any of the risk evaluation rules in keeping with your policies and risk-mitigation requirements. It also gives you the flexibility to modify the default risk score, scoring configuration, and scoring priorities of individual rules and selectively enable or disable the execution of one or more rules.

Besides preconfigured rules, the Rule Builder capability of RiskMinder enables you to create custom rules.

This guide provides information for planning the deployment of CA RiskMinder based on different solution requirements. Each solution consists of multiple components that interact with each other and other systems in an enterprise or multiple-network systems.

This section introduces you to the basic concepts of RiskMinder, explains its architecture, and then walks you through the features and enhancements that have been introduced in this release:

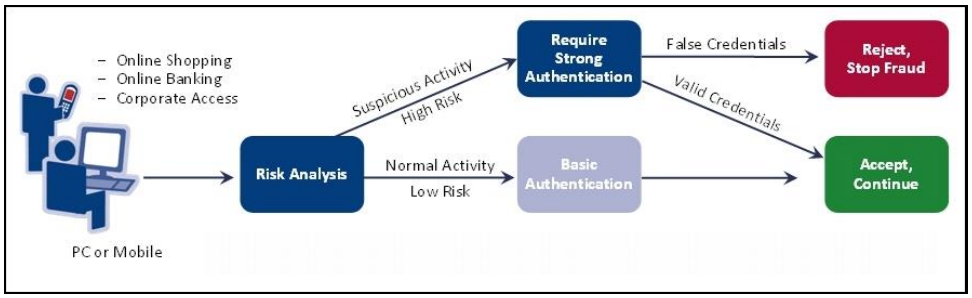
Note: CA RiskMinder still contains the terms Arcot and RiskFort in some of its code objects and other artifacts. Therefore, you will find occurrences of Arcot and RiskFort in all CA RiskMinder documentation. In addition, some of the topics in this guide do not follow the standard formatting guidelines. These inconsistencies will be fixed in a future release.

Introduction to RiskMinder

RiskMinder collects a wide range of data for risk evaluation (as discussed in "Data Used for Risk Evaluations" (see page 15)). This data is then evaluated with the help of configured rules (see "Rules and Risk Processing" (see page 19)). The result of each rule is then evaluated in the order of priority that is set by a RiskMinder administrator and a score and advice is generated corresponding to the first rule that matched ("Risk Score and Advice" (see page 23)). RiskMinder then creates a user-device association in the RiskMinder database ("User-Device Associations" (see page 25).)

How RiskMinder Works

The following figure illustrates how RiskMinder broadly assesses the risk and detects fraud for each transaction.



You can implement the risk analysis capability either *before* the user logs in to your online application or *after* they have successfully logged in.

Pre-Login Risk Assessment and Fraud Detection

When a user accesses your online application, you can assess them for potential risk even before they log in.

If you call the risk analysis capability even before a user logs in to your online application, then the risk evaluation workflow is as follows:

1. User accesses your online application.
2. Your application invokes RiskMinder to analyze the risk that is associated with the transaction.
3. RiskMinder evaluates the risk by using the incoming IP address of the user and the configured rules. It uses the data that is discussed in the section, "Location Information" (see page 17) for the purpose.
4. Based on the result of the rules that were executed and whether the assessed information matched, RiskMinder generates a Risk Score and Advice (see page 23).
5. Your application validates the user, as follows:
   - If the risk is low, the user is allowed to access your online application.
   - If the risk is high, the user is denied access to your online application.
   - If the transaction is tagged as suspicious, then your application challenges the user for additional (secondary) authentication to prove their identity.

Post-Login Risk Assessment and Fraud Detection

When a user accesses your online application and performs predefined actions (such as wire transactions), you can first log them in and then comprehensively assess them for potential risk.

If you call the risk analysis capability *after* you authenticate a user into your online application, then the risk evaluation workflow is as follows:

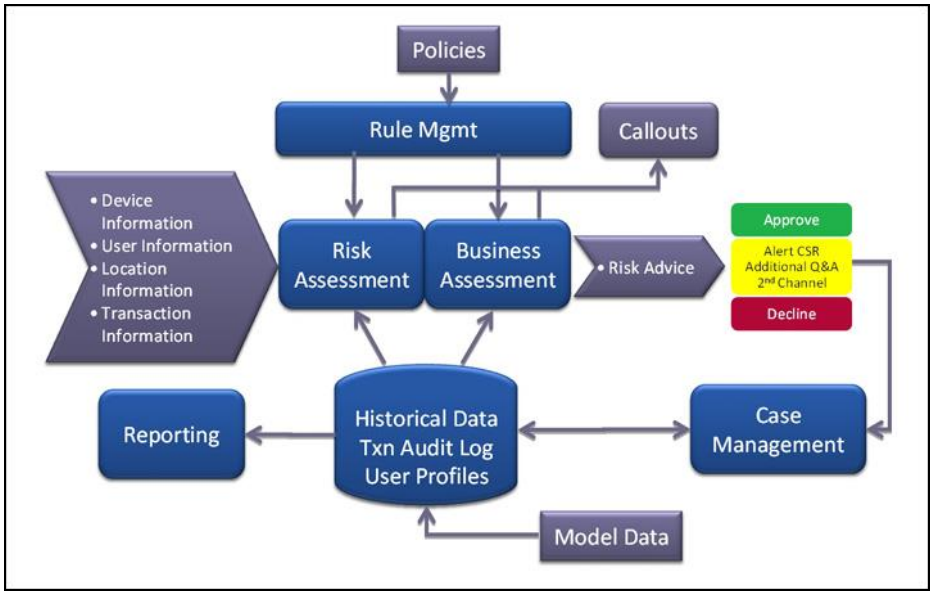
1. User logs in to your online application.
2. User tries to perform certain actions that you specify.
3. Your application invokes RiskMinder to analyze the risk that is associated with the transaction.
4. RiskMinder evaluates the risk by using the incoming inputs and the configured rules. It uses the data categories that are discussed in the section, "Data Used for Risk Evaluations" (see page 15) for the purpose.
5. Based on the result of rules that were executed and whether the assessed information matched, RiskMinder generates a Risk Score and Advice (see page 23).
6. Your application allows the user to continue with the transaction, as follows:
   - If the risk is low, the user is allowed to continue.
   - If the risk is high, the user is denied the transaction.
   - If the transaction is tagged as suspicious, then your application challenges the user for additional (secondary) authentication to prove their identity.

Data Used for Risk Evaluations

RiskMinder bases the result of a risk analysis by comparing the following incoming information, if available, with the historical data for the user:

- End-User Device Identification Information (see page 16)
- Location Information (see page 17)
- User and Transaction Information (see page 17)
- Case Management (see page 18)
- Fraud Model (see page 18)

The following figure illustrates how RiskMinder uses this data. The following subsections provide a quick overview of each of the data categories.



End-User Device Identification Information

The following sections briefly walk you through the device identification and analytics technique that RiskMinder applies:

- Device ID
- Machine FingerPrint (MFP)
- DeviceDNA

Device ID

The *Device ID* is a device identifier string that RiskMinder generates on the end user device to identify and track the device that the end user uses for logging in to your online application and performing transactions. The Device ID information is in encrypted format.

When RiskMinder evaluates a user for the first time, it generates the Device ID and sets it on the user's system. Every subsequent time the user is evaluated, RiskMinder verifies if the Device ID on the user's system matches the Device ID stored in the RiskMinder database. If the two Device IDs match, the incoming information is considered "safe".

Machine FingerPrint (MFP)

Machine FingerPrint (also referred to as Device fingerprinting or PC fingerprinting in industry terms) represents the browser information and device identification attributes (such as operating system, installed software applications, screen display settings, multimedia components, and other attributes) that are gathered from the end user's system and are analyzed to generate a risk profile of a device in real time. Some of the attributes that are collected from the end user's device include:

- Browser information (such as name, UserAgent, major version, minor version, JavaScript version, HTTP headers)
- Operating system name and version
- Screen settings (such as height, width, color depth)
- System information (such as time zone, language, system locale)

For every transaction performed by the end user, RiskMinder matches the corresponding MFP stored in its database with the incoming information. If this match percentage (%) is equal to or more than the value specified for the Device-MFP Match rule in Administration Console, then it is considered "safe".

DeviceDNA

DeviceDNA is a device identification and analytics technique that uses both Machine FingerPrint (MFP) and Device ID for more accurate information analyses. For accuracy, more information is collected than in the case of MFP. For example:

- Additional system information (such as platform, CPU, MEP, system fonts, camera, and speaker information)
- Additional browser information (such as vendor, VendorSubID, BuildID)
- Additional screen settings (such as buffer depth, pixel depth, DeviceXDPI, DeviceYDPI)
- Plug-in information (such as QuickTime, Flash, Microsoft Windows Media Player, ShockWave, Internet Explorer plug-ins)
- Network information (such as connection type)

Location Information

Derived from the end user's system IP address, this information includes geo-location information such as locale, ISP, time zone, and related geographical information. To obtain this information, RiskMinder is integrated with Quova®, which specializes in providing detailed geographic information for each IP address by mapping it to a region.

To know more about Quova and their services, go to:

http://www.quova.com

For every transaction performed by the end user, RiskMinder matches the incoming IP address and the information that is derived from this IP address with the related information stored in the RiskMinder database. This information is then used as input for Negative IP Address List, Negative Country List, and Zone Hopping rules.

User and Transaction Information

Typically, a user's login ID identifies a user uniquely in the system. RiskMinder uses this information as one of the attributes to identify a user uniquely.

If configured, RiskMinder can also accept contextual or transaction information (such as transaction amount, transaction type, and date) for analyzing the risk that is associated with a transaction. However, you use custom rules to enable RiskMinder to evaluate this contextual information.

Book: See the *CA RiskMinder Administration Guide* for information about adding custom rules.

Case Management

The Case Management feature of RiskMinder provides administrators and fraud analysts a single unified view of the data that is related to cases. This feature helps them analyze data more efficiently and take faster, better-informed decisions toward resolving the cases. In addition, analysts can also constantly track the status and progress of their cases and maintain complete case histories with instant access to all related information. As a result, Case Management can be used to analyze data and identify new patterns of fraud from historical data. These patterns, in turn, can be used to configure new rules to reduce fraud.

Case Management enables you to:

- Efficiently manage customer service and support
- Manage large numbers of cases and investigations
- Create actions and tasks with due dates
- Assign actions with due dates
- Record investigation notes and the resolution that is provided to the user
- Handle cases and tasks more efficiently
- Keep clear audit trail or history of actions on a case
- Analyze trends
- Generate fraud-related reports

Fraud Model

RiskMinder offers an advanced fraud modeling capability. Based on the historical data, this modeling capability can be built and created in RiskMinder. By using the available transaction data and system data, the model generates a score that describes the extent to which the model suspects the genuineness of a transaction. This score typically ranges from 0 through 100, where the higher the number, the greater the possibility of fraud. RiskMinder can be configured to send different responses to your calling application based on this model score.

The model score is available as a part of the system parameters (as ModelScore) while configuring rules on the Rules and Scoring Management page in Administration Console. This score can be used with other data elements to arrive at a risk advice.

Rules and Risk Processing

After the required data is collected, it is forwarded to *Rules Engine* (a module of RiskMinder Server). The Rules Engine is a set of configured rules that evaluate this information that is based on incoming information and historical data, if available.

A *rule*, in turn, is a condition or a set of conditions that must be true for a rule to be invoked. By default, each rule is assigned a priority and is evaluated in the specific order of its priority level. However based on your business requirements, you can change this priority of rule scoring.

The predefined rules that RiskMinder are explained in the following table:

Rule Name	Description
Exception User Check	An organization may choose to exclude a user from risk evaluation during a certain time interval. For example if a user travels to a country that is configured as negative in RiskMinder, then for the specified interval their status can be changed to an *exception user*. RiskMinder returns a low risk score for transactions originating from exception users and the advice is typically Allow.
Untrusted IP Check	This list constitutes the IP addresses that originate from anonymizer proxies or have been the origin of known fraudulent or malicious transactions in the past. Transactions originating from configured negative IP addresses receive a high score and the advice is Deny.
Negative Country Check	This list comprises the countries that have been known to be origins of significant number of frauds in the past. RiskMinder derives the country information based on the input IP address, and then uses this data to return a high risk score for online transactions originating from these "negative" countries. Transactions originating from configured negative countries receive a high score and the advice is Deny.

Rule Name	Description
Trusted IP/Aggregator Check	Transactions originating from IP addresses "trusted" to the organization receive a low score, by default, and the advice is Allow. Many enterprises use the services of account and data aggregation service providers to expand their online reach. The originating IP addresses when users log in from a protected portal versus when they come in through such aggregators are different. Transactions originating from aggregators "trusted" to the organization receive a low score, by default, and the advice is Allow.
Unknown User	An *unknown user* is not registered in the RiskMinder database. If the user is unknown to RiskMinder, then by default an Alert is returned. A Customer Support Representative (CSR) can then choose to further authenticate the user based on the advice.
Unknown DeviceID	The Device ID is a device identifier string that RiskMinder generates and stores on the end user's device to identify and track the device that the end user uses for logging in to your online application to perform transactions. RiskMinder returns a low risk score for transactions originating from known devices and the advice is typically Allow.
User Not Associated with DeviceID	■ Transactions originating from a device that is associated with a user, and whose DeviceDNA matches, receive a low score, and the advice is Allow. ■ Transactions originating from a known device that is not associated with a known user receive a medium score, and the advice is IncreaseAuth. **Note:** See "User-Device Associations" (see page 25), "Machine FingerPrint (MFP)", and "DeviceDNA" for more information about these topics.
Device MFP Not Match	■ Transactions originating from a known device whose DeviceDNA does not match receive a medium score, and the advice is IncreaseAuth. ■ Transactions originating from an unknown device that is not associated with a known user receive a high score, and the advice is Deny. **Note:** See "User-Device Associations" (see page 25), "Machine FingerPrint (MFP)", and "DeviceDNA" for more information about these topics.

Rule Name	Description
User Velocity Check	Frequent use of the same user ID could be an indication of risky behavior. For example, a fraudster might use the same user ID and password from different devices to watch a specific activity in a targeted account. Too many transactions originating from the same user within a short (configurable) interval receive a high score and the advice is IncreaseAuth.
Device Velocity Check	Frequent use of the same device could also be an indication of risky behavior. For example, a fraudster might use the same device to test multiple combinations of user IDs and passwords. Administrators can now configure RiskMinder to track this behavior, as well. Too many transactions originating from the same user device within a short (configurable) interval receive a high score and the advice is IncreaseAuth.
Zone Hopping Check	If a user logs in from two long-distance locations within a short time span by using the same user ID, this might be a strong indication of fraudulent activity. In addition, a User ID can also be shared, in which case, RiskMinder understands that the two people sharing the same User ID can be in geographically different locations and responds with an appropriate response. Transactions originating from the same user from locations that are far apart from each other within a short (configurable) interval receive a high score and the advice is IncreaseAuth.

The Rules Engine executes these rules in the order of their precedence. The evaluation result is then forwarded to another module of RiskMinder Server that is named the **Scoring Engine**. Between Rules Engine and Scoring Engine, the rules are run in the following phases:

- **Execution Phase**

  RiskMinder Server does a first parse of all the rules in the active ruleset. In this phase, the Server:

  a. Executes all the rules in the list in the order of execution priority.

     This execution priority is internal and is defined by the Server.

  b. Generates an individual risk score and advice for each rule it executes.

- **Scoring Phase**

  RiskMinder Server now does the second parse of the rules. In this phase, the Server:

  a. Uses the result for each rule in the first parse, and parses the rules in the ruleset based on the scoring priority.

     The scoring priority is configured by the Global Administrator (GA) by using the Administration Console.

  b. Stops the scoring at the first matched rule.

  c. Returns the score and advice of the rule that matched as final.

  Note: Depending on when the first rule matched, the second parse may not be run completely.

Risk Score and Advice

Based on the result of the execution of each rule that Rules Engine provides, the *Scoring Engine* evaluates the score of each rule in the order of priority set (by the administrator) and returns the score corresponding to the first rule that matched.

For example, consider that you have configured these rules in the following order:

1. Negative IP (say, with a score of 85)
2. User Velocity (say, with a score of 70)
3. High Amount Check (say, with a score of 80)
4. Device Velocity (say, with a score of 65)

Note: High scores are typically assigned to rules that are more critical.

If RiskMinder determines that a transaction is coming from a negative IP address, then it returns a score of 85 (Deny), based on the first configured rule that matched. If another transaction exceeds the configured Device Velocity, then RiskMinder returns a score of 65.

The *risk score* that is generated by the Scoring Engine is an integer from 1 through 100. RiskMinder then uses this risk score to generate the corresponding *advice* and returns this advice to your application.

The following table shows the default out-of-the-box risk score and corresponding advice matrix. You can configure these ranges according to your organization policies and requirements.

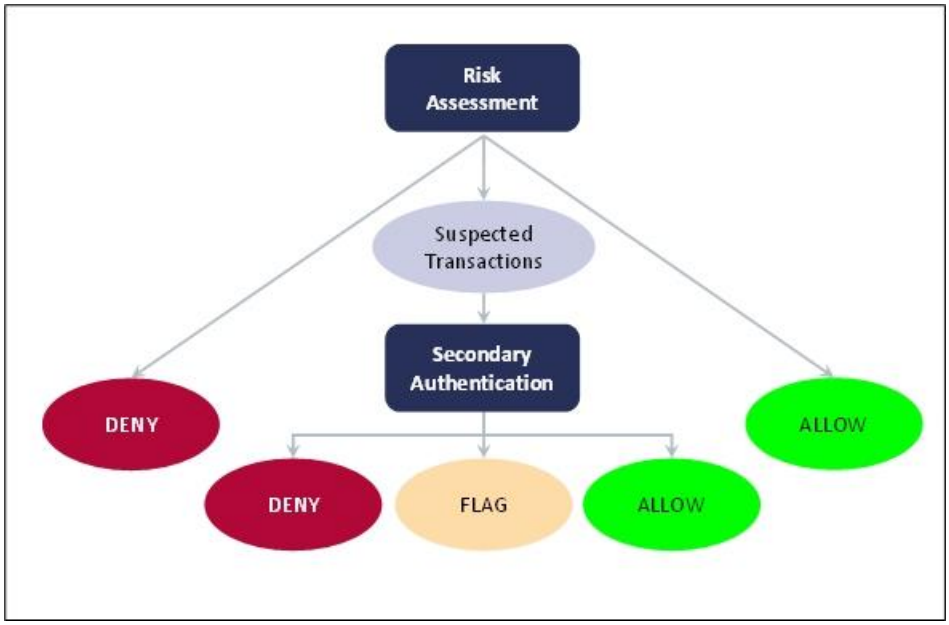
Score Value (From)	Score Value (To)	Advice	Default Recommended Action
0	--	--	The rule is executed but is not used for scoring.
1	30	ALLOW	Allow the transaction to proceed.
31	50	ALERT	Take an appropriate action. For example, if the user name is currently unknown, then on getting an alert you can either redirect it to a Customer Support Representative (CSR) or you can create a user in RiskMinder.
51	70	INCREASEAUTH	Perform additional authentication before proceeding any further.
71	100	DENY	Deny the transaction.

Based on the data that is received by RiskMinder, one of the following advices is generated:

- **ALLOW:** RiskMinder returns ALLOW, if the risk score associated with the transaction is low.
- **ALERT:** If a user who is not registered with RiskMinder tries to log in, then ALERT is returned.
- **INCREASE AUTHENTICATION:** When RiskMinder detects a suspicious transaction, it flags the transaction with INCREASE AUTHENTICATION and it advises the application to force the user for additional authentication.

  For example, when a user registered with RiskMinder attempts a transaction from a device that is not yet recognized by RiskMinder, then the user must undergo secondary authentication (such as OTP or QnA) with your application.
- **DENY:** RiskMinder returns the DENY advice when a high risk score is associated with the transaction.

The following figure illustrates the advices that RiskMinder returns.



User-Device Associations

For subsequent evaluations, RiskMinder uniquely identifies a user as a valid user by automatically associating (or binding) a user to the device that they use to access your application. This is referred to as an *association* (or device binding) in RiskMinder terminology. Users who are not bound are more likely to receive the Increase Authentication advice to be authenticated.

RiskMinder also allows users to be bound to more than one device. For example, a user can use a work and a home computer to access your application. Similarly, you can bind a single device to more than one user. For example, members of a family can use one computer to access your application.

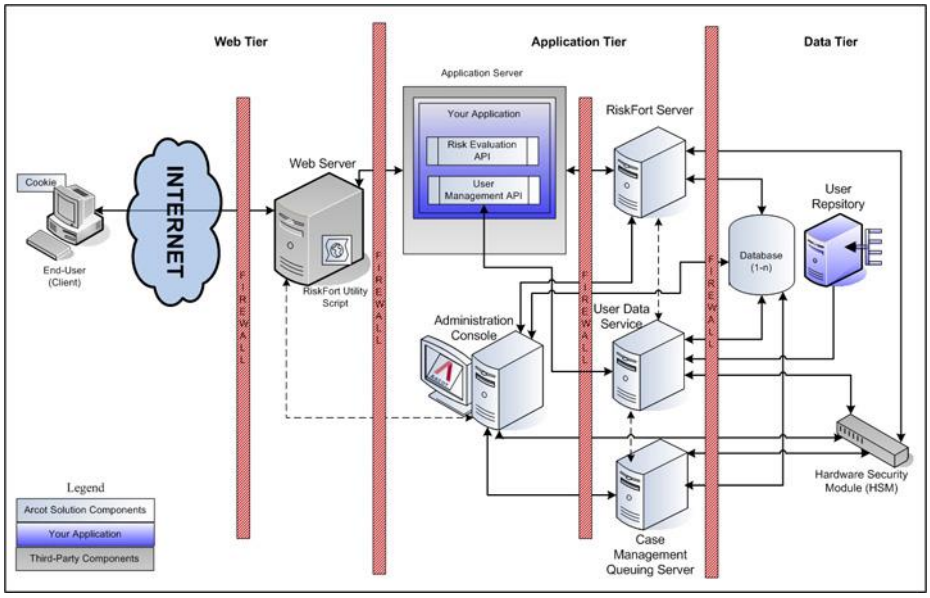
RiskMinder Architecture and Component Communication

This section covers the following topics:

RiskMinder Architecture

You can install RiskMinder on a single system or you can distribute its components across multiple systems, as discussed in later sections in the guide. However, to ensure maximum security and integrity of data and transactions, use the three-tier architecture that is shown in the following figure:

- Web Tier (see page 26)
- Application Tier (see page 27)
- Data Tier (see page 28)



The following subsections discuss the components of these layers.

Web Tier

This layer comprises the HTML content and interacts directly with the user over a network or the Internet.

The *RiskMinder Utility Script* (riskminder-client.js) is a client-side JavaScript that must be included in your application. This script is served to the end user's browser through the web servers that reside in this layer. This script enables you to:

- Set the Device ID on the end user's system.
- Collect the Machine FingerPrint (MFP), DeviceDNA, and Device ID information.

Note: See "Collecting Device ID and DeviceDNA" in the *CA RiskMinder Java Developer's Guide* for detailed information about DeviceDNA, Device ID, and using the utility script.

Application Tier

This layer constitutes all application server components in the system. These include RiskMinder Server, UDS, Administration Console, and the RiskMinder SDKs:

Note: All components in this layer can be installed on one system or can be distributed across multiple systems, as discussed in the chapters that follow.

- **RiskMinder Server**

  The server component that processes risk evaluation requests from your application through RiskMinder SDKs.

- **Case Management Queuing Server**

  The server component that schedules and dispatches cases to Customer Support Representatives (CSRs) and then manages the lifecycle of these cases.

- **Administration Console**

  A web-based console for configuring server instances and for managing organizations, administrators, and users. It is also the communication mode between RiskMinder components, business rules, and the corresponding data.

- **User Data Service**

  The abstraction layer that provides access to user- and organization-related data from different types of user repositories, such as relational databases (RDBMSs) and directory servers (LDAPs).

- **Risk Evaluation SDK**

  APIs and web services that can be invoked by your application to forward risk-analysis requests to RiskMinder Server.

- **Risk Evaluation Web Service**

  The web-based interface that enables interaction over a network between RiskMinder Server and your application. It consists of the web services that can be invoked by your web application to perform risk evaluation.

- **User Management Web Service**

  The web services that can be invoked by your application to forward requests to User Data Service for enrolling users and for managing user details in RiskMinder.

- **Sample Application**

  Sample Application demonstrates the usage of RiskMinder Java APIs and how your application can be integrated with RiskMinder. Sample Application can also be used to verify if RiskMinder was installed successfully, and if it is able to perform risk-evaluation operations.

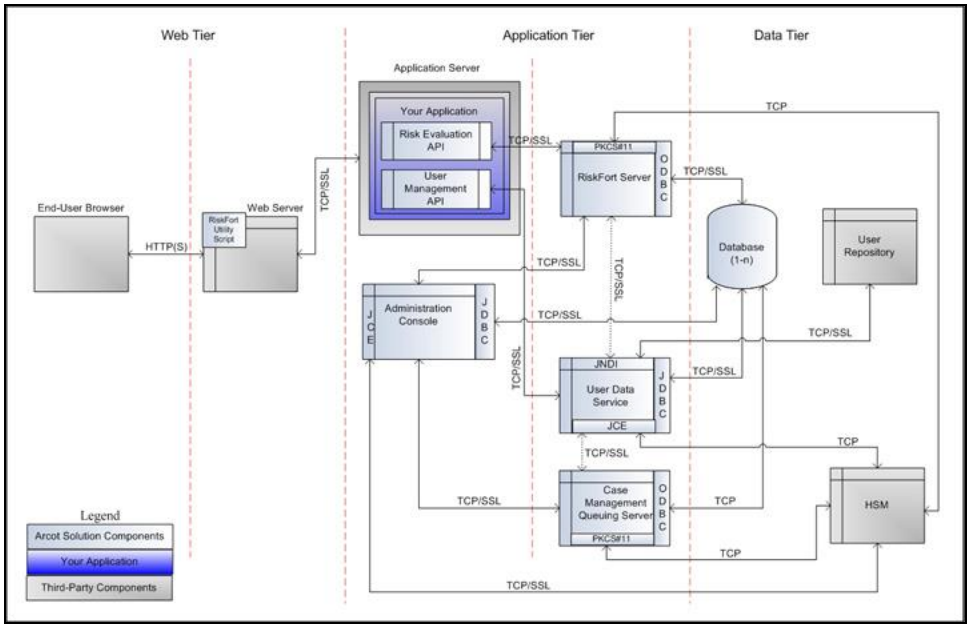
Data Tier

This layer comprises the instances of relational databases that store the configuration, user, and historical data that is used by RiskMinder to analyze each transaction. In addition, this layer also constitutes any directory servers (LDAPs) that you have configured for storing user details.

If you are planning to use any Hardware Security Modules (HSMs) for encrypting sensitive user data, then the HSM is also a part of this layer.

Communication Between RiskMinder Components

The following figure illustrates the possible communication modes that are supported between RiskMinder and its components.



As shown in the figure, the default mode of communication between components is TCP, RiskMinder Server supports SSL communication (two-way and one-way) with the following components to ensure integrity and confidentiality of the data being exchanged during a transaction:

- Case Management Queuing Server
- RiskMinder Database
- User Data Service
- RiskMinder SDK (Risk Evaluation)
- Sample Application
- Evaluation Callout
- Scoring Callout

Note: RiskMinder enables you to build custom rules, based on your business requirements. A custom rule is named **Evaluation Callout**. Similarly, RiskMinder also enables you to write your own custom Scoring logic named **Scoring Callout**.

See *CA RiskMinder Administration Guide* for more information about these callouts.

What's New in This Release

See the release notes for information about the key features and enhancements that have been introduced in release 3.1.01.

Chapter 2: Planning the Deployment

This section provides information that you can use to select a deployment model, and determine which RiskMinder components and prerequisite software to install on each system. The architecture diagrams for each deployment model are also provided to assist you with planning.

Note: In this guide, *System* refers to a physical device and *Server* refers to software that is run on the system.

The section covers the following topics:

Deployment Overview

The deployment procedure that you follow depends on whether you are performing a fresh installation of RiskMinder or upgrading from a previous release:

If You Are Performing a Fresh Installation

This section provides a quick overview of steps for deploying a fresh instance of RiskMinder and provides pointers for choosing a deployment model that is based on your requirements:

1. Choose a deployment model. RiskMinder can be installed on a single system or across multiple systems.

   See "Choosing a Deployment Model" (see page 34) for more information.

2. Ensure that the system where you plan to install RiskMinder and its components meets all hardware requirements.

   See "Hardware Requirements" (see page 45) for more information.

3. Install the prerequisite software products.

   See "Software Requirements" (see page 46) for more information.

4. Create a database user in the SQL database.

   See "Configuring Database Server" (see page 54) for more information.

5. Install RiskMinder:

   - See "Performing Complete Installation" (see page 68) for more information about installing in a single-system environment.
   - See "Installing on the First System" (see page 106) for more information about installing in a distributed environment.

6. To create the RiskMinder schema and set initial configuration preferences, run SQL scripts in the database:

   - See "Running Database Scripts" (see page 77) for more information about running SQL scripts for single-system deployments.
   - See "Running Database Scripts" (see page 117) for more information about running SQL scripts for distributed deployments.

7. Copy the required files and JARs on your application server. Administration Console and User Data Service (UDS) use these files and JARs for proper functioning:

   - See "Preparing Your Application Server" (see page 78) for more information about deploying and starting UDS and Administration Console for single-system deployments.
   - See "Preparing Your Application Server" (see page 118) for more information about deploying and starting UDS and Administration Console for distributed deployments.

8. Deploy Administration Console:

   - See "Logging In to Administration Console" (see page 89) on deploying Administration Console for single-system deployments.

- See "Logging In to Administration Console" (see page 128) on deploying Administration Console in a distributed environment.

9. Log in to Administration Console as a Master Administrator to initialize it:
   - See "Bootstrapping the System" (see page 89) for more information about initializing Administration Console for single-system deployments.
   - See "Bootstrapping the System" (see page 128) for more information about initializing Administration Console in a distributed environment.
10. Start RiskMinder Server and Case Management Queuing Server, and verify that the services are coming up correctly:
    - See "Starting RiskMinder Server" (see page 92), "Starting the Case Management Queuing Server" (see page 92), and "Verifying the Installation" (see page 96) for more information about initializing Administration Console for single-system deployments.
    - See "Starting RiskMinder Server" (see page 131), "Starting the Case Management Queuing Server" (see page 131), and "Verifying the Installation" (see page 134) for more information about initializing Administration Console in a distributed environment.
11. Deploy User Data Service (UDS):
    - See "Deploying User Data Service (UDS)" (see page 93) for more information about deploying and starting UDS for single-system deployments.
    - See "Deploying User Data Service (UDS)" (see page 132) for more information about deploying and starting UDS for single-system deployments.
12. (**For Distributed Installation Only**) Install RiskMinder on the subsequent systems.

    See "Installing on the Second System" (see page 135) for more information.
13. To test the RiskMinder installation, deploy and run Sample Application:
    - See "Deploying Sample Application" (see page 95) and "Using Sample Application" (see page 96) for more information about performing this task in a single-system environment.
    - See "Deploying Sample Application" (see page 136), "Configuring Sample Application for Communication with RiskMinder Server" (see page 137), and "Using Sample Application" (see page 138) for more information about performing this task in a distributed environment.
14. **(Optional)** Change the HSM settings that you specified during the installation:

    See "Changing Hardware Security Module Information After the Installation" (see page 223) for more information.

If You Are Upgrading from a Previous Release

This section provides a quick overview of steps for upgrading your RiskMinder instance and provides pointers for choosing a deployment model that is based on your requirements:

1. Ensure that the system where you plan to install RiskMinder and its components meets all hardware requirements.

   See "Hardware Requirements" (see page 45) for more information.

2. Install the prerequisite software products.

   See "Software Requirements" (see page 46) for more information.

3. Upgrade RiskMinder.

   See "Upgrading RiskMinder" (see page 149) for more information.

Choosing a Deployment Model

RiskMinder Server is the primary component of the RiskMinder deployment because it provides the risk evaluation service. You integrate your application with the RiskMinder Server by using the Java SDKs or web services that are shipped with the RiskMinder Server.

RiskMinder also requires an SQL database for storing server configuration data, user-specific preferences, and usage data.

Typically, all RiskMinder components are installed on a single system for development and simple testing. However, in production deployments and staging environments, RiskMinder Server must be installed on its own system. The Java SDKs or web services are installed on the system or systems on which your application is installed.

RiskMinder is also shipped with a Sample Application, which can be used to verify that RiskMinder was installed properly and to perform risk evaluation. Sample Application also serves as a code sample for integrating RiskMinder with your existing application.

The following high-level deployment types are supported by RiskMinder:

- **Single-System Deployment** - For development or testing
- **Distributed-System Deployment** - For production or staging environments
- **High-Availability Deployment** - For high availability and scalability, production, or staging environments

Deploying on a Single System

In a single-system deployment, all components of RiskMinder and the application, which users log in to, are installed on a single system. The database may be on the same system where RiskMinder is installed, or on a different system.

This deployment model is typically used for development, proof of concept, or initial testing.

It is possible to use both Java SDKs and web services in a single-system deployment. The prerequisite software for these components is identical.

The simplest way to perform a single-system deployment is to select the **Complete Installation** (see "Performing Complete Installation" (see page 68) for more information) option while running the RiskMinder installer.

Component Diagrams

The diagrams in this section depict possible deployment options for prerequisite software and RiskMinder components. If you perform a **Complete Installation**, then both Java SDKs and web services are copied on the system. You can choose to use one or both integration methods, in this case.

- Deploying Java SDKs
- Deploying Web Services

Decision Points

If you plan to perform a single-system deployment, then decide on the following items:

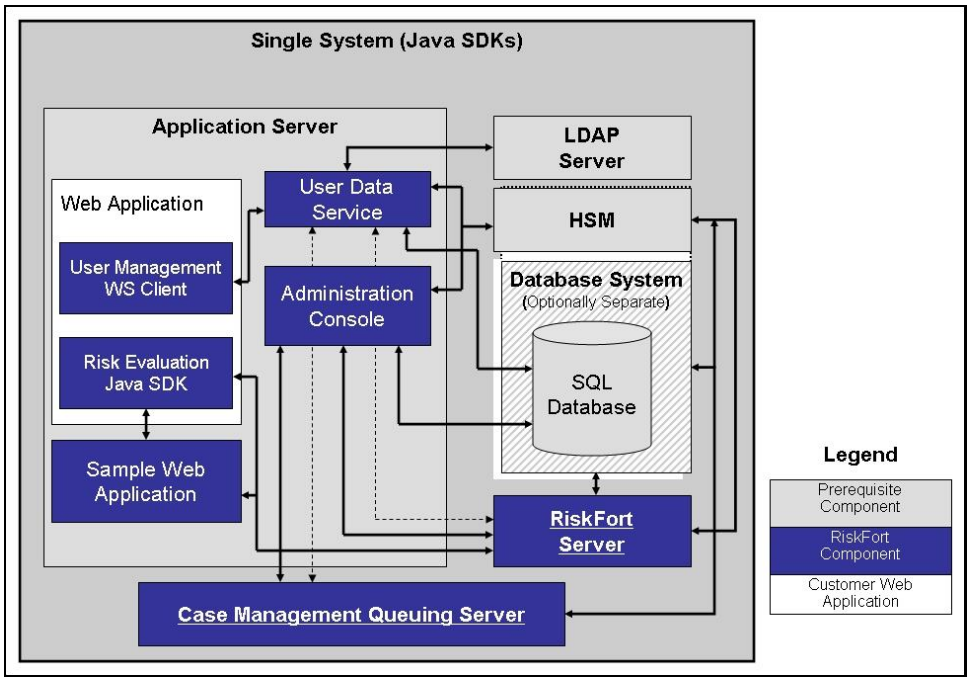
- Install a database server on the system which has RiskMinder Server, or use an existing database on a separate system?
- Use Sample Application or write your own application?

  Important! Sample Application must *not* be used in production deployments. It is recommended that you build your own web application by using Sample Application as a code reference.
- Use Java SDKs or web services to integrate with your own application?

The following sections provide information that is aimed at helping you achieve your deployment decision.

Deploying Java SDKs

The following figure shows RiskMinder Server and Java SDKs deployed on a single system:

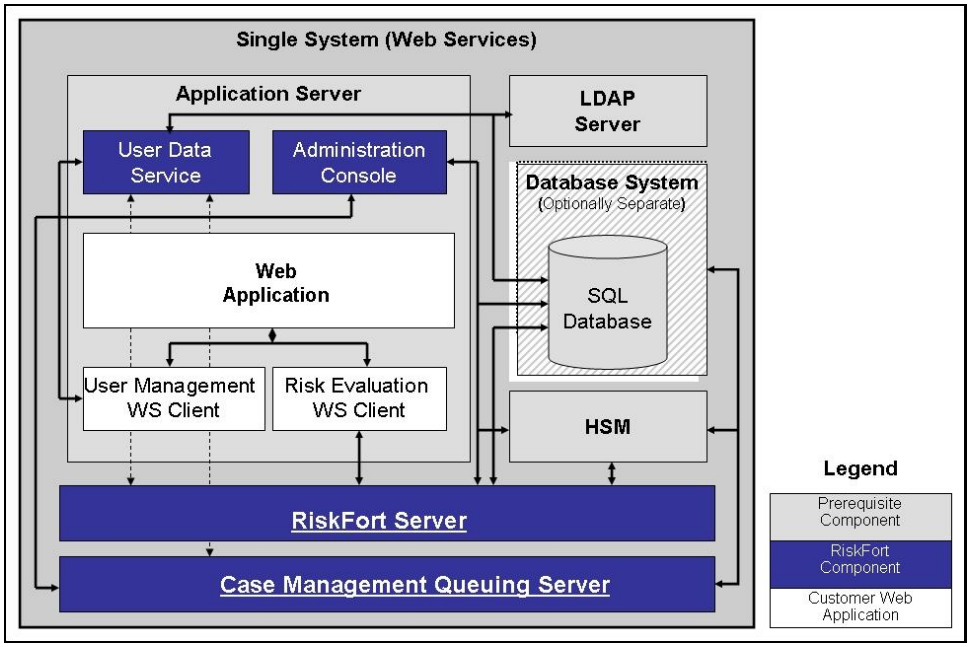

Single System (Java SDKs)
Application Server
Web Application
User Management WS Client
Risk Evaluation Java SDK
Sample Web Application
User Data Service
Administration Console
LDAP Server
HSM
Database System
(Optionally Separate)
SQL Database
RiskFort Server
Case Management Queuing Server
Legend
Prerequisite Component
RiskFort Component
Customer Web Application

Note: The use of a web server to deliver HTML pages for the application server is optional and is transparent to RiskMinder. In production deployments, this approach helps improve the application server performance and security. See the documentation of your application server for detailed information.

Deploying Web Services

If you plan to deploy web services, then the following figure shows RiskMinder Server and web services on a single system.

Note: Because all web services are built into the RiskMinder Server module itself, you can install RiskMinder Server on the target system and then generate the requisite client stubs. No further configuration is required.



Deploying on Distributed Systems

The distributed model is typical of web-based applications whose components are distributed across the web tier, application tier, and data tier, and require a secure zone between its web servers and application servers. The other reasons for deploying RiskMinder in a distributed model are as follows:

- High availability (failover and load balancing)
- High performance
- Increase in throughput

In a distributed-system deployment, RiskMinder components are installed on different servers. This strategy helps improve security and performance, and also enables multiple applications to use the risk-evaluation functionality.

This deployment model is typically used for production deployments or for staging environments.

The most common deployment is to install RiskMinder Server on one system and one or more web applications on other systems. Because the deployment covers more than one system, an architecture diagram is included for showing the systems that must be able to communicate with each other.

To perform a distributed-system deployment, you select the **Custom** installation option (See "Installing on the First System" (see page 106) for more information) option in the RiskMinder installer.

The Component Diagrams (see page 40) for a high-availability deployment are discussed in this section.

Component Diagrams

The diagrams in this section depict several possible options, where prerequisites and RiskMinder components can be installed on multiple systems:

- Deploying Single Application with Java SDKs
- Deploying Multiple Applications with Java SDKs
- Deploying Single Application with Web Services

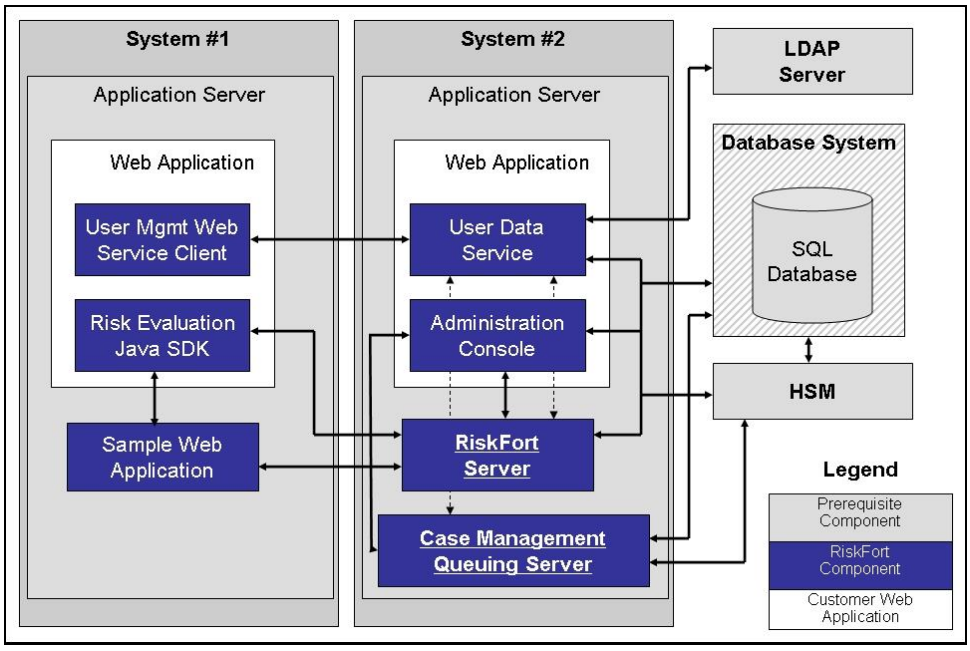
Decision Point

- What RiskMinder components must be installed on each system?

The following sections provide information that is aimed at helping you achieve your deployment decision.

Deploying Single Application with Java SDKs

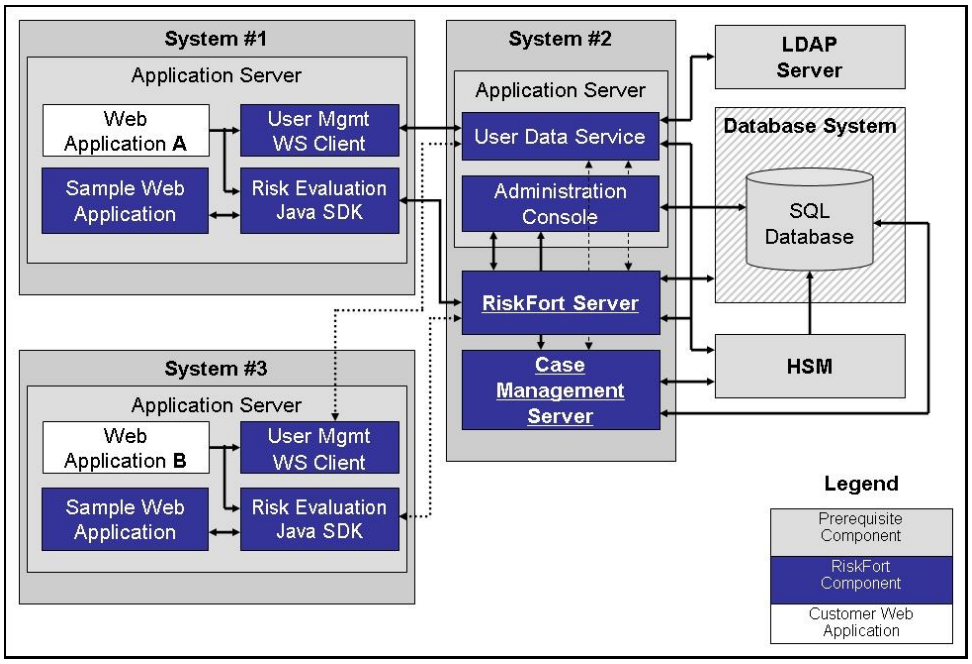
The following figure illustrates RiskMinder using Java SDKs with a single application.



Note: Administration Console can be installed on any individual system, every system, or on a system that is not listed in the diagrams.

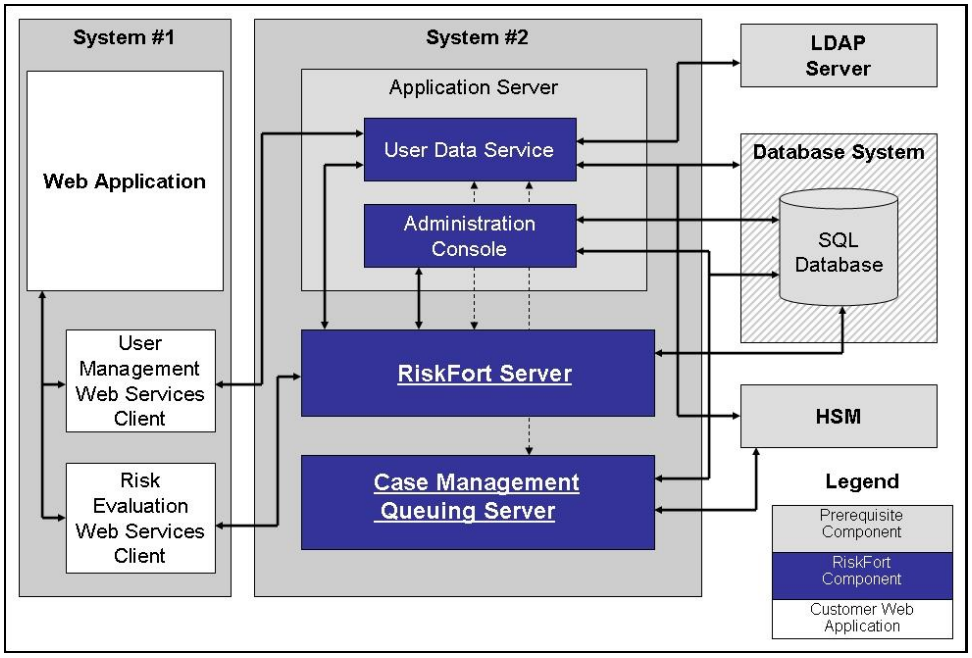
Deploying Multiple Applications with Java SDKs

The following figure illustrates RiskMinder deployment using Java SDK with multiple applications.



Deploying Single Application with Web Services

The following figure illustrates RiskMinder deployment using web services on a single application.



Deploying in a High-Availability Environment

In a high-availability deployment, RiskMinder components are installed on more than one server to provide high availability and scalability. This section discusses the Component Diagrams (see page 43) for deploying in a high-availability environment.

Component Diagrams

The diagrams in this section depict several possible options for which prerequisites and RiskMinder components can be installed on multiple systems for a high-availability deployment.

Decision Points

- When do I add a server instance?

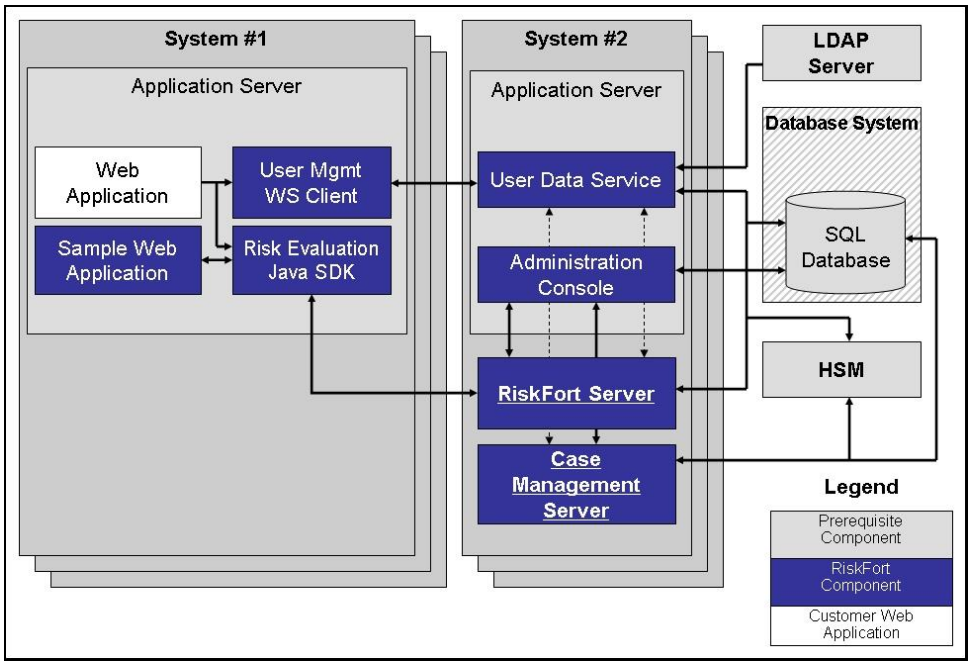
  Typically, when your transaction rate exceeds the permissible threshold (as decided by your organizational policies), then you add a server instance.

- How many RiskMinder Server, Case Management Server, UDS, and SDK instances can I have?
  - **RiskMinder Servers:** Multiple instances are supported. The number depends on the transaction rate you want to achieve.
  - **Case Management Queuing Servers:** Multiple instances are supported. The number depends on the transaction rate you want to achieve.
  - **Administration Consoles:** Multiple instances are supported. The number depends on the number of administrators in the system who log in to the Administration Console simultaneously.
  - **UDS Servers:** Currently, only one is supported.
  - **SDKs:** Multiple instances are supported. This number depends on the number of your application instances that you plan to support.

The following sections provide information that is aimed at helping you achieve your deployment decision.

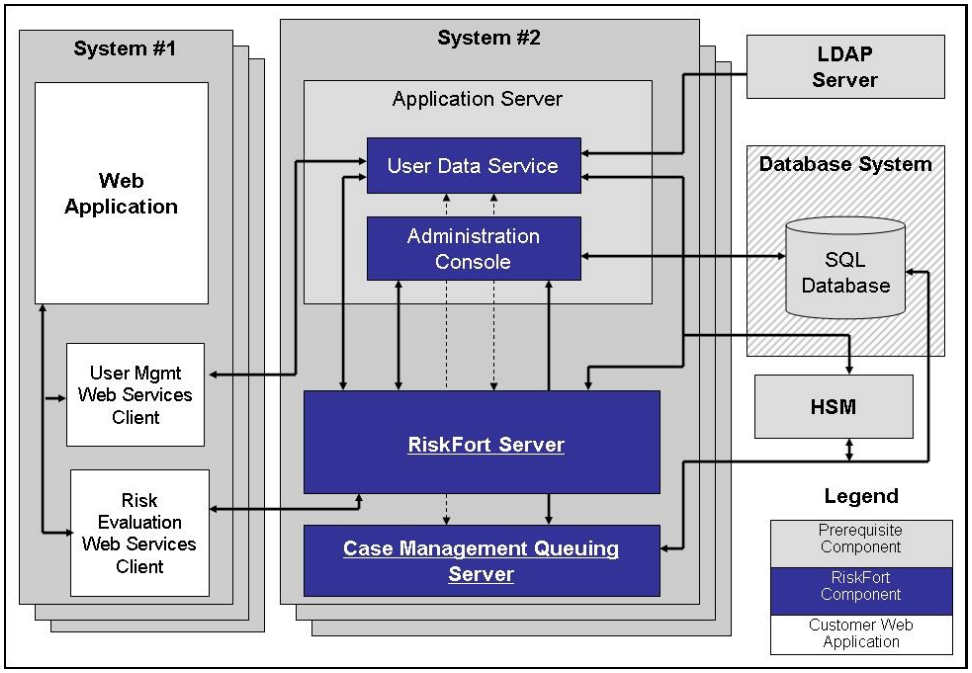
High-Availability Deployment Using Java SDK

The following figure illustrates multiple-instance deployment of RiskMinder using Java SDK.



High-Availability Deployment Using Web Services

The following figure illustrates multiple-instance deployment of RiskMinder using web services.



Chapter 3: Preparing for Installation

Before you install RiskMinder Server and its components, ensure that your deployment environment meets the requirements that are described in this section. The section also provides configuration and planning-related information.

This section contains the following sections:

Risk Authentication Hardware Requirements

The *minimum* hardware requirements for installing Risk Authentication include:

- Requirements for Risk Authentication with the database on a single system:
  - **RAM:** 2 GB
  - **Hard Drive Space:** 10 GB
  - **Processor:** 2.4 GHz
- Requirements for Risk Authentication with the database on a different system:
  - **RAM:** 1 GB
  - **Hard Drive Space:** 300 MB
  - **Processor:** 2.4 GHz

Note: Hardware resource requirements vary substantially for different applications and usage patterns. It is recommended that you load-test your site to determine the optimal memory that is required for the installation. While load-testing, keep in mind that some operating system utilities for monitoring memory can overstate memory usage (partially because of the representation of shared memory). The preferred method for determining memory requirements is by monitoring the improvement in performance after adding more RAM/physical memory in the load test. See your platform vendor documentation for information about configuring memory and processor resources for testing purposes.

Hardware Security Module (HSM) Requirements

You can now store sensitive keys either in the database or in an HSM. Currently, you can store the various encryption keys and the RiskMinder Server listener SSL key in the HSM. The following table lists the requirements for the supported HSM modules.

HSM Module	Java Cryptography Extension (JCE)	PKCS #11
Thales nCipher netHSM (or nCipher netHSM)	JCE framework provided with 32-bit versions of JDK 5.0, JDK 6.0, and JDK 7.0	pkcs11v2.01
SafeNet High Availability HSM (or Luna HSM)		

Note: The decision to use and configure an HSM must be made while you are still in the planning and preparation stages. Otherwise, you must reinitialize the database later, because all your current encryption would use software keys.

Software Requirements

The following sections provide information about software requirements:

- Minimum Software Requirements (see page 46)
- RiskMinder Component-Specific Prerequisites (see page 53)

Minimum Software Requirements

The following sections list the minimum software requirements:

- For Solaris SPARC (see page 46)
- For Red Hat Enterprise Linux (see page 50)

For Solaris SPARC

The following table lists the minimum software requirements to install RiskMinder.

Note: For all the third-party software mentioned in the following table, it is assumed that the higher versions are compatible with the specified supported version.

Software Type	Version
Operating System	Solaris 10 (SPARC) (64-bit)

Software Type	Version
Patches	Latest patches For the latest patches, access *http://sunsolve.sun.com*, click the **Patches and Updates** link, click the **Patch Cluster & Patch Bundle Downloads** link, and under **Solaris Patch Clusters** expand the **Recommended Patch Clusters** to display the Solaris 10 SPARC 05/08 Patch Bundle entries.
Database Server	■ Microsoft SQL Server 2005, Standard Edition (SP2) or higher ■ Microsoft SQL Server 2008 Enterprise Edition
	■ Oracle 10*g* ■ Oracle 11*g* Release 2
	■ MySQL Enterprise Edition 5.1
JDBC Drivers (JARs)	The JDBC driver best compatible with your database. **Important!** It is recommended that the JDBC JAR version is same as or higher than your database server version.
Directory Server	The following Directory Servers are supported: ■ Microsoft Windows Active Directory Server 2003 ■ Microsoft Windows Active Directory Server 2008 ■ SunOne Directory Server 5.2 ■ SunOne Directory Server 6.3 ■ Oracle Directory Server 11*g* ■ CA Directory Server r12.0 Service Pack 10

Software Type	Version
Application Server	The following Application Servers are supported: ■ Apache Tomcat 5.5.*x* (Here, *x* is 31 or higher) ■ Apache Tomcat 6.*x* ■ Apache Tomcat 7.*x* ■ IBM WebSphere 6.1.*x* **Important!** If you are planning to use WebSphere 6.1, then ensure that you apply the **6.1.0.41: WebSphere Application Server V6.1 Fix Pack 41** and **6.1.0.41: Java SDK 1.5 SR12 FP5 Cumulative Fix for WebSphere Application Server**. ■ IBM WebSphere 7.0 ■ JBoss Application Server 5.1.*x* ■ Oracle WebLogic 10.1.*x* ■ Oracle WebLogic 11*g* (WebLogic Server 10.3) The **JVM Memory** Settings (Heap Size) for the application server must be a minimum of 512 MB. However, if you plan to use an LDAP repository with large user base (for example, 100,000 users), then it is strongly recommended that you increase the Heap Size to 1 GB or higher. To set the Heap Size to 512 MB, use the -Xmx512M JVM memory setting.Similarly, to set the Heap Size to 1 GB, use the -Xmx1024M setting. **Note:** Do not set the -Xms parameter.

Software Type	Version
JDK **Note:** If you perform a fresh installation of JDK, then include the new path in the JAVA_HOME environment variable. In addition, ensure that the application server uses the same JAVA_HOME. If you fail to do so, then Administration Console and other JDK-dependent components may fail to start.	The JDK version that is best compatible with the Application Server that you are using: ■ IBM JDK 1.5 or higher ■ IBM JDK 1.6 or higher ■ Oracle JDK 5.0 or higher ■ Oracle JDK 6.0 or higher ■ Oracle JDK 7.0 ■ Oracle JRockit 5.0 or higher ■ Oracle JRockit 6.0 or higher **Important!** If you are using JRockit, then ensure that *JROCKIT_HOME*/jre/bin/ must be included in the PATH environment variable. In addition, this change in the PATH variable *must* be effective before you start the WebLogic application server.
Web Service Clients	The following clients are supported: ■ Axis2 1.5 ■ .NET Framework 4
Browsers	The following Web browsers are supported: ■ Internet Explorer 7.0 ■ Internet Explorer 8.0 ■ Internet Explorer 9.0 ■ Mozilla Firefox 18 or higher ■ Apple Safari 5.0 or higher ■ Google Chrome 20 or higher

For Red Hat Enterprise Linux

The following table lists the minimum software requirements to install RiskMinder.

Note: For all third-party software mentioned in the following table, it is assumed that the higher versions are compatible with the specified supported version.

Software Type	Version
Operating System	■ Red Hat Enterprise Linux 5.x (x86) (32-bit) ■ Red Hat Enterprise Linux 5.x (x86) (64-bit) ■ Red Hat Enterprise Linux 6.x (x86) (32-bit) ■ Red Hat Enterprise Linux 6.x (x86) (64-bit)
Update	Update 1 and higher
Patches	Latest patches Access the latest patches at *http://www.redhat.com*. Log in to your account, download the latest updates and patches, and apply them as needed.
Database Server	■ Microsoft SQL Server 2005, Standard Edition (SP2) or higher ■ Microsoft SQL Server 2008 Enterprise Edition
	■ Oracle 10*g* or higher ■ Oracle 11*g* Release 2
	■ MySQL Enterprise Edition 5.1
JDBC Drivers (JARs) **Important!** It is recommended that the JDBC JAR version is the same as or higher than your database server version.	The JDBC driver version that is compatible with your database.

Software Type	Version
Directory Server	The following Directory Servers are supported: ■ Microsoft Windows Active Directory Server 2003 ■ Microsoft Windows Active Directory Server 2008 ■ SunOne Directory Server 5.2 ■ SunOne Directory Server 6.3 ■ Oracle Directory Server 11*g* ■ CA Directory Server r12.0 Service Pack 10
Application Server	The following Application Servers are supported: ■ Apache Tomcat 5.5.x (x can be 31 or higher) ■ Apache Tomcat 6.x (32-bit and 64-bit) ■ Apache Tomcat 7.x (32-bit and 64-bit) ■ Oracle WebLogic 10.1.x (32-bit and 64-bit) ■ IBM WebSphere 6.1.x **Important!** If you are planning to use WebSphere 6.1, then ensure that you apply the **6.1.0.41: WebSphere Application Server V6.1 Fix Pack 41** and **6.1.0.41: Java SDK 1.5 SR12 FP5 Cumulative Fix for WebSphere Application Server**. ■ IBM WebSphere 7.0 (32-bit and 64-bit) ■ JBoss 5.1.x ■ Oracle WebLogic 11g (WebLogic Server 10.3) (32-bit and 64-bit)

Software Type	Version
	The **JVM Memory** Settings (Heap Size) for the application server must be a minimum of 512 MB or higher to support Arcot User Data Service (UDS) deployment. **Note:** If you plan to create organizations in the LDAP repository with a large user base (for example, 100,000 users), then it is recommended that you increase the heap size to 1 GB or higher. To set the heap size to 512 MB, use the -Xmx512M JVM memory setting. To set the heap size to 1 GB, use the -Xmx1024M JVM memory setting. *Do not* use the -Xms parameter when you set the JVM memory setting.
JDK **Note:** If you perform a fresh installation of JDK, then include the new path in the JAVA_HOME environment variable, and ensure that the application server uses the same JAVA_HOME. If you fail to do so, then the Administration Console and other JDK-dependent components may fail to start.	The JDK version that is best compatible with the Application Server that you are using: ■ IBM JDK 1.5 or higher ■ IBM JDK 1.6 or higher ■ Oracle JDK 5.0 or higher ■ Oracle JDK 6.0 or higher ■ Oracle JDK 7.0 ■ Oracle JRockit 5.0 or higher ■ Oracle JRockit 6.0 or higher **Important!** If you are using JRockit, then ensure that *JROCKIT_HOME*/jre/bin/ is included in the PATH environment variable. In addition, this change in the PATH variable must be effective before you start the WebLogic application server.
Web Service Clients	The following clients are supported: ■ Axis2 1.5 or higher ■ .NET Framework 4 or higher

Software Type	Version
Browsers	The following Web browsers are supported: ■ Internet Explorer 7.0 ■ Internet Explorer 8.0 ■ Internet Explorer 9.0 ■ Mozilla Firefox 18 or higher ■ Apple Safari 5.0 or higher ■ Google Chrome 20 or higher

Risk Authentication Component-Specific Prerequisites

The prerequisite software is determined by the Risk Authentication components to be installed on a system. See "Planning the Deployment" (see page 31) to determine what Risk Authentication components to install for each deployment type.

The following table lists the prerequisite software that is required by each Risk Authentication component:

Component	Prerequisite		
	Database Server	**JDK**	**Application Server**
Risk Authentication Server	+		
Case Management Queuing Server	+		
Administration Console	+	+*	+
User Data Service	+	+*	+
Risk Evaluation Java SDK		+*	+
User Management Web Service		+*	+
Administration Web Service		+*	+
Transaction Web Service		+*	+
Sample Application		+*	+

* The JDK depends on the application server you are using.

Configuring Database Server

Before you install RiskMinder, set up the database for storing user information, server configuration data, audit log data, and other information.

RiskMinder supports a primary database and also a backup database, which can be used during failover and failback in high-availability deployments. Database connectivity can be configured in one of the following ways:

- Automatically during the RiskMinder installation, when the installer edits the arcotcommon.ini (see page 204) file with the database information you supply.
- Later, manually by:
  a. Editing the arcotcommon.ini (see page 204) file.
  b. Editing the DSN, as required for the server component.
  c. Updating securestore.enc by using the DBUtil tool.

There are specific configuration requirements for each supported database (Microsoft SQL Server, MySQL, or Oracle). Use the following information to set up the database server yourself, or provide this information to your database administrator (DBA) when you request a database account.

Important! To protect the database, it is recommended that the database server be protected with a firewall or any other access control mechanism and is set to the same time-zone as all CA products.

- Configuring Microsoft SQL Server (see page 54)
- Configuring Oracle Database (see page 56)
- Configuring MySQL (see page 57)

Configuring Microsoft SQL Server

This section provides the following configuration information for Microsoft SQL Server:

Note: See the Microsoft SQL Server documentation for detailed information about performing the tasks that are listed in this section.

- Verifying Authentication Mode (see page 55)
- Creating a Database (see page 55)
- Creating a Database User (see page 55)

Verifying Authentication Mode

Verify that Microsoft SQL Server is configured to use the **SQL Server and Windows Authentication mode** for Server authentication. RiskMinder cannot connect to the database if Microsoft SQL Server is configured to work in **Windows Authentication Mode**. You can verify the mode by right-clicking the server in the Object Explorer window and selecting the Security page.

Creating a Database

To create a database, use the following criteria:

1. The recommended name is arcotdb.
2. The database size must be configured to grow automatically.

Creating a Database User

To create a database user, use the following steps:

Note: Microsoft SQL Server refers to a user as a login.

1. In the SQL Server Management Studio, go to *<SQL_Server_Name>*, expand the Security folder, and then click Logins.

   Note: The *<SQL_S*erver_Name> refers to the host name or IP address of the SQL Server where you created your database.

2. Right-click the Logins folder, and click New Login.
3. Enter the Login name. The recommended name is arcotuser.
4. Set the following parameters:
   a. Authentication to SQL Server Authentication.
   b. Specify Password and Confirm password for the login.
   c. Ensure that you specify other password settings on this page according to the password policies of your organization.
   d. Default database to the database (arcotdb) you created.
   e. User Mapping for the login (in the Users mapped to this login section).
   f. User Mapping (SQL 2005) for the default database to db_owner (in the Database role membership for: <db_name> section).

Configuring Oracle Database

This section provides the configuration information for Oracle Database and RiskMinder Server.

Note: See the Oracle Database documentation for information about performing the tasks that are listed in the following sections.

Required Tablespaces

Running RiskMinder on Oracle requires two tablespaces:

- The first tablespace is used for configuration data, audit logs, and user information. This tablespace can be the default user tablespace in the RiskMinder database.

  See "Creating a New Database" **(see page 56)** for creating a database.

- The second tablespace is used to run reports. For high performance, it is recommended that you use a separate tablespace.

RiskMinder Database Configuration Script

The RiskMinder database configuration script, arcot-db-config-for-common-2.0.sql, automatically creates the tablespace for reports if the database user running the script has sufficient permissions to create a tablespace. If the user does not have the required permissions, delete the section in this script that creates the reports tablespace and manually create the tablespace.

Important! The parameters for creating the reports tablespace in the arcot-db-config-for-common-2.0.sql database script can be changed according to your requirements. However, the tablespace name must be ARReports.

To set up Oracle Database, perform the following steps:

1. Creating a New Database (see page 56)
2. Creating a Database User (see page 57)

Creating a Database

Create a database that stores information in the UTF-8 character set. This allows RiskMinder to use international characters including double-byte languages. To enable UTF-8 support for your Oracle database:

1. Log in to the Oracle database server as SYS or SYSTEM.
2. Run the following command:
   ```
   Update sys.props$ set value$='UTF8' where
   name='NLS_NCHAR_CHARACTERSET' Or name = 'NLS_CHARACTERSET';
   ```
3. Restart the database and check whether the character set is configured to UTF-8.

Creating a Database User

Create a user with the following criteria:

1. Create a user (recommended name is arcotuser), with a schema in the new database arcotdb.
2. Set the quota of the user to *at least* 5 to 10 GB for a development or test deployment, which is primarily used for audit logs.

   Note: If the deployment is for production, staging, or other intensive testing, refer to appendix, "Database Reference" (see page 227) to determine the quota that must be set for the user.
3. Grant the DBA role to the user.

Configuring MySQL

To set up the MySQL database, perform the following steps:

Note: See the MySQL documentation for information about performing the following tasks.

- Enabling Support for the InnoDB Transaction Engine (see page 57)
- Setting the lower_case_table_names Variable (see page 57)
- Creating a New Database (see page 56)
- Creating a Database User (see page 57)

Enabling Support for the InnoDB Transaction Engine

RiskMinder uses the InnoDB storage engine of MySQL. To check whether your MySQL installation supports this storage engine, use the SHOW ENGINES command. If the output of this command shows that InnoDB is not supported, enable support for InnoDB.

Note: For information about the procedure to enable support for InnoDB, see the MySQL documentation.

Setting the lower_case_table_names Variable

If you are running MySQL on a non-Windows platform, set the lower_case_table_names variable to 1.

Note: For detailed information about this variable, see the MySQL documentation.

Creating a Database

To create a database:

1. Open a MySQL command window.
2. To create the database schema, run the following command:
   `CREATE SCHEMA '<schema-name>' DEFAULT CHARACTER SET utf8;`
3. To create the database user, run the following command:
   `CREATE USER '<user-name>' identified by '<user-password>';`

Creating a Database User

Create a user with the following criteria:

1. Create a user (recommended name is arcotuser) in the new database arcotdb.
2. Grant the user the following privileges:
   - Object rights:
     - SELECT
     - INSERT
     - UPDATE
     - DELETE
     - EXECUTE
   - DDL rights:
     - CREATE
     - ALTER
     - CREATE ROUTINE
     - ALTER ROUTINE
     - DROP
   - Other rights:
     - GRANT OPTION

Getting Ready for Installation

Before you proceed with the RiskMinder installation, set up the RiskMinder data store and the Database Client, and then gather the required database information for use during the installation. Ensure that the JDK and application server that are required by the RiskMinder components are installed.

This section discusses the following topics:

Configure UTF-8 Support on Client Systems

Enable UTF-8 support on the systems where you plan to install the RiskMinder components (for example, RiskMinder Server, Administration Console, and User Data Service) that communicate with the database server.

To enable UTF-8 support on your UNIX platform, set the following environment variables:

- NLS_LANG=en_US.UTF-8
- LC_CTYPE=en_US.UTF-8

Database Information that You Need for Installing RiskMinder

Perform the tasks that are described in this section on the system where you plan to install RiskMinder or the RiskMinder components.

MS SQL Database

Get the following database information from the DBA. You use this information when you install RiskMinder:

- Server
- Database
- User Name
- Password
- Port Number

Refer to Performing Complete Installation *(see page 68)* for more information about these parameters.

Oracle Database

Get the following database information from the DBA. You use this information when you install RiskMinder:

- Service ID (Instance identifier of the Oracle database)
- Host Name
- Port Number
- User Name
- Password

See Performing Complete Installation (see page 68) for more information about these parameters.

MySQL Database

Get the following database information from the DBA. You use this information when you install RiskMinder:

- Server
- Database
- User Name
- Password
- Port Number

Refer to Performing Complete Installation *(see page 68)* for more information about these parameters.

Requirements for Java-Dependent Components

Install the following components that are required by Administration Console, RiskMinder Java SDKs, and Web services:

- JDK

  Note: If you perform a fresh installation of JDK, then set the JAVA_HOME environment variable. The PATH variable must point to $JAVA_HOME/**bin**/. If you fail to do so, then Administration Console and other JDK-dependent components may fail to start.

- Application Server

(Optional, Only If You are Using HSMs) Requirements for HSM

If you are planning to use HSM to store encryption keys, then set up the following items before you proceed:

- HSM Server
- HSM Client
- At least one 3DES key that has been created in HSM (this 3DES key is used to encrypt information in the database)

  Important! Ensure that you have written down the labels of the 3DES keys in a secure location.

See your platform vendor documentation for detailed information about how to install and configure your HSM Server and Client components and generate the required keys.

Pre-Installation Checklist

It is recommended that you complete the following checklist before you proceed with installing RiskMinder.

Note: This is an indicative list with sample values. Before you begin the installation, modify this checklist so that it covers all the items that apply to your operating environment.

Your Information	Example Entry	Your Entry
HARDWARE		
Processor	SPARC	
RAM	2 GB	
Disk Space	20 GB	

Your Information	Example Entry	Your Entry
SOFTWARE		
Operating System	Solaris 10	
Distribution	Enterprise Edition	
Service Pack (or Patch)	SP3	
DATABASE		
Type	Oracle	
Database Name *(Microsoft SQL Server Only)*	arcotdb	
DSN Name	arcotdsn	
Host Name (or Server IP Address)	51.100.25.24	
Port	1521	
Service ID (*Oracle Database Only*)	oradb1	
User Name	rfdbadmin	
Password	password1234!	
Configured Privileges: **Note:** For all CREATE privileges, the corresponding DROP privilege is implied.		
Oracle Database		
CREATE TABLE		
CREATE INDEX		
CREATE SEQUENCE		
CREATE PROCEDURE		
CREATE SESSION		
DML PRIVILEGES		
RESOURCE PRIVILEGES		
CONNECT PRIVILEGES		
ALTER TABLE		
ALTER EXTENT PARAMETERS		
CREATE TABLESPACE (*For Reports*)		

Your Information	Example Entry	Your Entry
UNLIMITED TABLESPACE (*For Reports,* Optional)		
DROP TABLESPACE		
MS SQL Server **Note:** The user performing these actions must belong to the ddladmin role. If the database user is dbowner, then the database user already has the ddladmin privilege.		
CREATE TABLE		
CREATE INDEX		
CREATE PROCEDURE		
REFERENCES		
DML PRIVILEGES		
CONNECT PRIVILEGES		
ALTER		
MySQL		
SELECT		
INSERT		
UPDATE		
DELETE		
EXECUTE		
CREATE		
ALTER		
CREATE ROUTINE		
ALTER ROUTINE		
DROP		
GRANT OPTION		
APPLICATION SERVER		
Type	Apache Tomcat 5.5.31	

Your Information	Example Entry	Your Entry
Host Name	localhost	
Port	8080	
JDK	1.5.0_10	
DIRECTORY SERVICE		
Host Name	ds.myldap.com	
Port	389	
Schema Name	inetorgperson or user	
Base Distinguished Name	dc=myldap,dc=com	
User Name	cn=admin,cn=Administrators,cn=dscc	
Password	mypassword1234!	
WEB SERVER (OPTIONAL)		
Type	IIS 6	
Host Name	mywebserver.com	
Port	443	

Chapter 4: Deploying RiskMinder On a Single System

Use the **Arcot RiskFort 3.1.01 InstallAnywhere Wizard** to install RiskMinder components. This Wizard supports *Complete* and *Custom* installation types. To install and configure RiskMinder on a single computer, use the **Complete** option when you run the installer.

The following steps provide a quick overview of the process:

1. Run the RiskMinder installer to install RiskMinder components and configure them to access your SQL database.

   See "Performing Complete Installation" (see page 68) for install instructions.

2. Execute the database scripts to create RiskMinder schema and database tables. Also ensure that the database setup was successful.

   See "Running Database Scripts" (see page 77) and "Verifying the Database Setup" (see page 78) for more information.

3. Copy to your application server the files that are required by UDS and Administration Console to function correctly.

   See "Preparing Your Application Server" (see page 78) for more information.

4. Deploy Administration Console on the application server and verify the deployment.

   See "Deploying Administration Console" (see page 86) for more information.

5. Log in to Administration Console with the Master Administrator credentials to initialize RiskMinder.

   See "Logging In to Administration Console" (see page 89) and "Bootstrapping the System" (see page 89) for more information.

6. Start RiskMinder Server and Case Management Queuing Server and verify if the services start successfully.

   See "Starting RiskMinder Server" (see page 92), "Starting the Case Management Queuing Server" (see page 92), and "Verifying the Installation" (see page 96) for more information.

7. Deploy User Data Service (UDS) on the application server and verify the deployment.

   See "Deploying User Data Service (UDS)" (see page 93) for more information.

8. Deploy and use Sample Application to test the RiskMinder configuration.

   Note: Sample Application is automatically installed as a part of Complete installation.

   See "Deploying Sample Application" (see page 95) and "Using Sample Application" (see page 96) for more information.

9. (Optional) To secure communication between RiskMinder components, you can configure them to support SSL (Secure Socket Layer) transport mode.

   Note: See *CA RiskMinder Administration Guide* for more information.

10. Complete the installation checklist.

    See "Post-Installation Checklist" (see page 100) for more information.

11. (Optional) Change the HSM settings that you specified during installation.

    See appendix, "Changing Hardware Security Module Information After the Installation" (see page 223) for more information.

Important Notes Related to the Installation

Keep the following points in mind while installing RiskMinder either on a single system or in a distributed environment:

- Ensure that the *<install_location> does not contain* any special characters (such as ~ ! @ # $ % ^ & * ( ) _ + = { }[ ] ’ ").
- The MySQL database name should not contain dot (.) characters.
- Currently, you cannot modify or repair RiskMinder components by using the installer. Uninstall the component, and then re-install it.
- Do not close the installer window, if the installation is in progress. If at any time during the installation (*especially during the last stages*), you click the **Cancel** button to abort the installation, then the installer may not remove *all* the directories that it created. Manually clean up the installation directory, <*install_location*>/arcot/ and its subdirectories.
- If you run the installer on a system that already contains an instance of an existing ARCOT_HOME, then:
  - You are not prompted for an installation directory.
  - You are not prompted for the database setup. The installer will use the existing database.
  - You are not prompted to set up encryption.
  - If you have already installed CA AuthMinder release 7.1.01, you will be shown the screens for performing a custom RiskMinder installation.

    You can install and use CA AuthMinder along with CA RiskMinder. Both products use certain common components, which are copied during the installation of either product. If you have already installed AuthMinder 7.1.01 and you are now starting the RiskMinder installation procedure, the RiskMinder installer can detect the presence of the common components that were copied during the AuthMinder installation. The RiskMinder installer then displays the screens for performing a custom installation.

Performing Complete Installation

Complete installation allows you to install all components of the RiskMinder package. These components include RiskMinder Server and the scripts that are required for setting up the database.

Note: Before you proceed with the installation, ensure that all prerequisite software components are installed and the database is set up. See chapter, "Preparing for Installation" (see page 45) for more information.

Perform the following tasks to install RiskMinder components:

1. Log in and navigate to the directory where you untarred the installer.
2. Ensure that you have the permission to run the installer. If not, run the following command:
   - **On Solaris:** chmod a=rx Arcot-RiskFort-3.1.01-Solaris-Installer.bin
   - **On Linux:** chmod a=rx Arcot-RiskFort-3.1.01-Linux-Installer.bin
3. Run the installer by typing the following command and then pressing **Enter**:
   - **For Solaris:**
     ```
     prompt> sh Arcot-RiskFort-3.1.01-Solaris-Installer.bin
     ```
   - **For Linux:**
     ```
     prompt> sh Arcot-RiskFort-3.1.01-Linux-Installer.bin
     ```
     Note: If you are executing the installer with root login, then a warning message appears. Enter **Y** to continue, or enter **N** to quit the installation. If you exit the installer screen, then run the installer again.

   The Welcome screen appears.
4. Press **Enter** to continue with the installation.

   The License Agreement screen appears.
5. On the License Agreement screen:
   a. Carefully read the text and press **Enter** to display the next screen of the license text. You may have to press **Enter** multiple times, until the entire text for License Agreement is displayed.

      At the end of the license agreement, you are prompted to accept the terms of the license agreement.
   b. Enter **y** to accept the acceptance of License Agreement and to continue with the installation.

      Note: If you press **n**, then a warning message is displayed and the installation is stopped.

   The Choose Installation Location screen appears.
6. As directed on the screen, you can perform one of the following steps:

- Enter the absolute path of the directory where you want to install RiskMinder and press **Enter** to continue.

  Note: The installation directory name that you specify *must not* contain any spaces. If it does, then some RiskMinder scripts and tools may not function as intended.

- Press **Enter** to accept the default directory that is displayed by the installer.

The installer displays the installation options that are supported by RiskMinder.

7. **(Applicable only if you are installing on a system that already has an existing Advanced Authentication product installed)** The installer displays the following options:

   - **1** - Enter a new path.
   - **2** - Use the location at which the existing Advanced Authentication product is installed.

8. **(Applicable only if you are installing on a system that already has an existing Advanced Authentication product installed)** Select the required option and press **Enter** to continue with the installation.

   Note: If you selected option **1** or **2**, then a directory named arcot is created at the specified location.

   The Installation Type screen appears. This screen displays the installation types (Complete and Custom) supported by RiskMinder.

9. Enter **1** to select the default (Complete) option and install all components of RiskMinder, and press Enter to continue.

   The Database Type screen appears. This screen lists the database types that are supported by RiskMinder.

10. Enter the number corresponding to your choice of database, and press Enter to continue:

    - **1** - Microsoft SQL Server
    - **2** - Oracle Database
    - **3** - MySQL

    The Primary Database Access Configuration screen appears.

    Note: CA RiskMinder release 3.1.01 is now certified to work with Oracle Real Application Clusters (Oracle RAC). To use Oracle RAC with your RiskMinder Installation, select Oracle Database in this step, perform the next step (Step 11), and then perform the steps in Configuring CA RiskMinder for Oracle RAC (see page 253).

11. On the Primary Database Access Configuration screen:

    - Specify the information that is listed in the following table if you specify **1** (SQL Server) in the preceding step.

Parameter	Description

Parameter	Description
Primary ODBC DSN	The installer creates the DSN by using this value. RiskMinder Server then uses this DSN to connect to the RiskMinder database. The recommended value to enter is arcotdsn. **Note:** Database Source Name (DSN) specifies the information that is required to connect to a database by using an ODBC driver. This information includes database name, directory, database driver, User ID, and password.
User Name	The database user name for RiskMinder to access the database. This name is specified by the database administrator. (MS SQL Server, typically, refers to this as login.) **Note:** The User Name for the Primary and Backup DSNs *must* be different.
Password	The password associated with the **User Name** you specified in the previous field and which is used by RiskMinder to access the database. This password is specified by the database administrator.
Server Name	The host name or IP address of the RiskMinder datastore. ■ Default Instance **Syntax**: *<server_name>* **Example**: demodatabase
Port Number	The port at which the database listens to the incoming requests. **Note:** Press **Enter**, if you want to accept the default port.
Database	The name of the Microsoft SQL Server database instance.

- Specify the information that is listed in the following table if you specify **2** (Oracle) in the preceding step.

Parameter	Description
Primary ODBC DSN	The installer creates the DSN by using this value. RiskMinder Server then uses this DSN to connect to the RiskMinder database. The recommended value to enter is arcotdsn. **Note:** Database Source Name (DSN) specifies the information that is required to connect to a database by using an ODBC driver. This information includes database name, directory, database driver, User ID, and password.
User Name	The database user name for RiskMinder to access the database. This name is specified by the database administrator. **Note:** The User Name for the Primary and Backup DSNs *must* be different.
Password	The password associated with the **User Name** you specified in the previous field and which is used by RiskMinder to access the database. This password is specified by the database administrator.
Service ID	The Oracle System Identifier (SID) that refers to the instance of the Oracle database running on the server.
Port Number	The port at which the database listens to the incoming requests. **Note:** Press **Enter**, if you want to accept the default port.
Host Name	The host name or IP address of the RiskMinder datastore. **Syntax**: *<server_name>* **Example**: demodatabase

- Specify the information that is listed in the following table if you specify **3** (MySQL) in the preceding step.

Parameter	Description
Primary ODBC DSN	The installer creates the DSN by using this value. RiskMinder Server then uses this DSN to connect to the RiskMinder database. The recommended value to enter is arcotdsn. **Note:** Database Source Name (DSN) specifies the information that is required to connect to a database by using an ODBC driver. This information includes database name, directory, database driver, User ID, and password.
User Name	The database user name for RiskMinder to access the database. This name is specified by the database administrator. **Note:** The User Name for the Primary and Backup DSNs *must* be different.
Password	The password associated with the **User Name** you specified in the previous field and which is used by RiskMinder to access the database. This password is specified by the database administrator.
Server Name	The host name or IP address of the RiskMinder datastore. ■ Default Instance **Syntax**: *<server_name>* **Example**: demodatabase ■ Named Instance **Syntax**: *<server_name>**<instance_name>* **Example**: demodatabase\instance1
Port Number	The port at which the database listens to the incoming requests. **Note:** Press **Enter**, if you want to accept the default port.
Database	The name of the MySQL database instance.

The screen to configure backup database access appears.

1. On the backup database access configuration screen, perform one of the following steps:
   - Type **n** to skip the configuration of the secondary DSN, when prompted, and press Enter to continue to the next screen.
   - Type **y** to configure the secondary DSN, when prompted, and press Enter to continue.

     See the tables in the previous step for database-specific information about the tasks to be performed.

   The Encryption Configuration screen appears. Use this screen to select the encryption mode and configure the information that is used for encryption.

2. Specify the following information and press Enter to continue:

Field Name	Description
Master Key	Specify the password for the Master Key, which is stored at <*install_location*>/arcot/conf/securestore.enc and will be used to encrypt the data stored in the database. By default, this value is set to MasterKey. **Note:** If you want to change the value of Master Key *after* the installation, then regenerate securestore.enc with a new Master Key value. See appendix, "Changing Hardware Security Module Information After the Installation" (see page 223) for more information.
Do you want to configure HSM Module?	Enter **y** if you want to use a Hardware Security Module (HSM) to encrypt the sensitive data or enter n to use the software encryption. If you do not select this option, then, by default, the data is encrypted by using the Software Mode.
Choose Hardware Module	Choose one of the following HSMs that you plan to use: ■ 1 - Luna HSM ■ 2 - nCipher netHSM
HSM PIN	Enter the password to connect to the HSM.

Field Name	Description
Note: The HSM parameter values are recorded in arcotcommon.ini, at <*install_location*>/arcot/conf. To change these values *after* installation, edit this file, as discussed in appendix, "Configuration Files and Options" (see page 201).	Set the following HSM information: ■ **Shared Library:** The absolute path to the PKCS#11 shared library corresponding to the HSM. For Luna (libCryptoki2.so) and for nCipher netHSM (libcknfast.so), specify the absolute path and name of the file. ■ **Storage Slot Number:** The HSM slot where the 3DES keys used for encrypting the data are available. The default value for **Luna** is 0, and for **nCipher netHSM** the default value is 1.

The Pre-Installation Summary screen appears. This screen lists the product details, installation directory, type of installation, and components that are to be installed.

1. Carefully review the product details displayed and press Enter to proceed with the installation. If you would like to change a configuration on any of the previous screens, click Back until you reach the screen, make the required changes, and press Enter to proceed to the next screen.

   The Ready to Install screen appears.

2. Press **Enter** to continue. This may take several minutes, because the installer now:

   - Copies all the components and their related binaries in the installation directory.
   - Stores database settings in the arcotcommon.ini (see page 204) file and the password in the securestore.enc file.
   - Writes to the required INI files.
   - Sets the environment variables such as, JNI_LIBRARY_PATH for Administration Console and ODBC_HOME, ODBCINI, ORACLE_HOME, and ORACLE_LIB_PATH in the arrfenv file.
   - Creates or overwrites, as specified in a previous screen, the Primary DSN and Backup DSN (if selected and configured) by using the selected ODBC driver in the odbc.ini file.

   After the preceding tasks are completed successfully, the Installation *Complete* screen appears.

3. Press **Enter** to exit the installer.

   You may have to wait for a few minutes (for the installer to clean up temporary files) until the prompt reappears.

4. Ensure that UTF-8 support is enabled:

   a. Navigate to the <*install_location*>/arcot/odbc32v70wf/odbc.ini file.

   b. Locate the [ODBC] section.

   c. Ensure that the IANAAppCodePage=106 entry is present in the section.

   d. If you do not find this entry, then add it.

   e. Save and close the file.

Note: After the installation is completed, perform the post-installation tasks that are discussed in Performing Post-Installation Tasks (see page 76).

Installation Logs

After installation, you can access the installation log file (Arcot_RiskFort_Install_<*timestamp*>.log) in the <*install_location*> directory. For example, if you had specified the /opt directory as the installation directory, then the installation log file is created in the /opt directory.

If the installation fails for some reason, then error messages are recorded in this log file.

Performing Post-Installation Tasks

This section guides you through the post-installation tasks that you must perform after installing RiskMinder. These steps are required for configuring RiskMinder correctly and must be *performed in the following order*:

1. Running Database Scripts (see page 77)
2. Verifying the Database Setup (see page 78)
3. Preparing Your Application Server (see page 78)
4. Deploying Administration Console (see page 86)
5. Logging In to Administration Console (see page 89)
6. Bootstrapping the System (see page 89)
7. Starting RiskMinder Server (see page 92)
8. Starting the Case Management Queuing Server (see page 92)
9. Deploying User Data Service (UDS) (see page 93)
10. Deploying Sample Application (see page 95)
11. Verifying the Installation (see page 96)
12. Using Sample Application (see page 96)

Note: After you complete these post-installation tasks, perform the SDK and Web services configuration tasks that are discussed in chapter, "Configuring RiskMinder SDKs and Web Services" (see page 143).

Running Database Scripts

Important! Before you run the scripts discussed in this section, you must ensure that you are logged in as the same database user that you created in Configuring Database Server (see page 54).

RiskMinder is shipped with scripts that are required to create necessary tables in the RiskMinder database. To run the required database scripts:

1. Navigate to the following directory:
   `<install_location>/arcot/dbscripts/`
2. Based on the database that you are using, navigate to one of the following subdirectories:
   - For Oracle Database: oracle/
   - For Microsoft SQL Server: mssql/
   - For MySQL: mysql/
3. Regardless of whether you have a single database for reports *and* transactions, or a separate database for reports, run the scripts in the following order:
   a. arcot-db-config-for-common-2.0.sql
   b. arcot-db-config-for-riskfort-3.1.01.sql

      Important! If you have installed CA AuthMinder release 7.1.01, you need not run arcot-db-config-for-common-2.0.sql because you have already run it while installing AuthMinder release 7.1.01.

   c. (**Optional**, only if you need to create the 3D Secure Channel) arcot-db-config-for-3dsecure-3.1.01.sql

Verifying the Database Setup

After you run the required database scripts, verify that the RiskMinder schema is seeded correctly.

Follow these steps:

1. Log in to the RiskMinder database as the user who installed the database.

   Note: If you are following the upgrade path, then log in to the database as the user who upgraded the database.

2. Run the following query:
   ```
   SELECT SERVERNAME, VERSION FROM ARRFSERVERS;
   ```

   You must see the following output as a result of the preceding query:
   ```
   SERVERNAME                    VERSION
   ------------------------  ----------------
   RiskFort                       3.1.01
   RiskFortCaseManagement         3.1.01
   ```

3. Log out of the database console.

Preparing Your Application Server

Two components of RiskMinder, User Data Service (UDS) and Administration Console, are web-based and can be deployed on any of the following supported application servers:

- Apache Tomcat
- IBM WebSphere
- Oracle WebLogic
- JBoss Application Server

Before you deploy the WAR files for these web applications on the application server of your choice, copy the files that are required by UDS and Administration Console to the appropriate location on your application server. This section describes the steps to copy the required crypto files to your application server and to deploy the WAR files of these web applications:

- Step 1: Setting Java Home (see page 79)
- Step 2: Copying Database Access Files to Your Application Server (see page 80)
- Step 3: Copying JDBC JAR Files to Your Application Server (see page 83)
- Step 4: (Mandatory for Oracle WebLogic 10.1) Creating Enterprise Archive Files (see page 85)

Step 1: Setting Java Home

Before you deploy the WAR files for UDS and Administration Console on the application server, ensure that you set the JAVA_HOME environment variable to the Java home directory of the application server.

In addition, $JAVA_HOME/**bin**/ must be added to the PATH variable. If you fail to do so, then Administration Console, UDS, and other JDK-dependent components may fail to start.

Step 2: Copying Database Access Files to Your Application Server

UDS and Administration Console use the following files to access the RiskMinder database securely:

- arcot-crypto-util.jar available at: *install_location*/arcot/java/lib/
- libArcotAccessKeyProvider.so available at: *install_location*/arcot/native/<platform>/<32bit-or-64bit>/
- As a result, these files must be copied to the appropriate location on the application server where you have deployed these RiskMinder components. The following subsections provide information about copying these files.

Apache Tomcat

To copy the files that are required for database access:

1. Copy arcot-crypto-util.jar to *Tomcat_JAVA_HOME*/jre/lib/ext/.

   Here, *Tomcat_JAVA_HOME* represents the JAVA_HOME used by your Apache Tomcat instance.

2. Copy libArcotAccessKeyProvider.so to:
   - For Solaris: *Tomcat_JAVA_HOME*/jre/bin/
   - For RHEL: *Tomcat_JAVA_HOME*/jre/bin/
3. Set and export the LD_LIBRARY_PATH to the directory where the libArcotAccessKeyProvider.so file is copied.
4. Restart the application server.

IBM WebSphere

To copy the files that are required for database access:

1. Log in to WebSphere Administration Console.
2. Click Environment, and then click Shared Libraries.
   a. From the Scope drop-down, select a valid visibility scope. The scope must include the target server or node on which the application is deployed.
   b. Click New.
   c. Enter the Name, for example, ArcotJNI.
   d. Specify the Classpath.

      This path must point to the location where the arcot-crypto-util.jar file is present and must also include the file name. For example, *install_location*/arcot/java/lib/arcot-crypto-util.jar.

   e. Enter the JNI Library path.

This path must point to the location where the libArcotAccessKeyProvider.so file is present.

3. Click Apply to save the changes.
4. Configure the server-level class loaders.
   a. Click Servers, and then click Application Servers.
   b. Under Application Servers, access the settings page of the server for which the configuration must be performed.
   c. Click Java and Process Management and then click Class Loader.
   d. Click New.
   e. Select the option "default Classes loaded with parent class loader first" and click OK.
   f. Click the auto-generated Class Loader ID.
   g. On the class loader Configuration page, click Shared Library References.
   h. Click Add, select ArcotJNI, and then click Apply.
   i. Save the changes.
5. Copy libArcotAccessKeyProvider.so to:
   - For Solaris: *WebSphere_JAVA_HOME*/jre/bin/
   - For RHEL: *WebSphere_JAVA_HOME*/jre/bin/

   Here, W*ebSphere_JAVA_HOME* represents the JAVA_HOME used by your IBM WebSphere instance.
6. Restart the application server.

Oracle WebLogic

To copy the files that are required for database access:

1. Copy libArcotAccessKeyProvider.so to:
   - For Solaris: *WebLogic_JAVA_HOME*/jre/bin/
   - For RHEL: *WebLogic_JAVA_HOME*/jre/bin/

   Here, *Weblogic_JAVA_HOME* represents the JAVA_HOME used by your Oracle WebLogic instance.
2. Copy arcot-crypto-util.jar to the WebLogic folder *WebLogic_JAVA_HOME*/jre/lib/ext/.

   Note: Ensure that you use the appropriate *JAVA_HOME* used by WebLogic.
3. Log in to WebLogic Administration Console.
4. Navigate to Deployments.
5. Enable the Lock and Edit option.

6. Click Install and navigate to the directory that contains the arcot-crypto-util.jar file.
7. Click Next to open the Application Installation Assistant.
8. Click Next to display the Summary page.
9. Click Finish.
10. Activate the changes.
11. Set and export the LD_LIBRARY_PATH to the directory where the libArcotAccessKeyProvider.so file is copied.
12. Restart the application server.

JBoss Application Server

To copy the files that are required for database access:

1. Copy libArcotAccessKeyProvider.so to:
   - For Solaris: *JBoss_JAVA_HOME*/jre/bin/
   - For RHEL: *JBoss_JAVA_HOME*/jre/bin/

   Here, *JBoss_JAVA_HOME* represents the JAVA_HOME used by your JBoss Application Server instance.
2. Copy arcot-crypto-util.jar to *JBoss_JAVA_HOME*/jre/lib/ext/.
3. Set and export the LD_LIBRARY_PATH to the directory where the libArcotAccessKeyProvider.so file is copied.
4. Restart the application server.

Step 3: Copying JDBC JAR Files to Your Application Server

RiskMinder requires the following JDBC JAR files for the supported databases:

- **Oracle 10g:** Oracle JDBC Driver (10.2.0.1.0)
- **Oracle 11g:** Oracle JDBC Driver (11.2.0.2.0)
- **Microsoft SQL Server:** MSSQL JDBC Driver (1.2.2828)
- **MySQL:** MySQL JDBC Driver (5.1.22)

The following sections walk you through the steps for copying the JDBC JAR required for your database to one of the following application servers.

Apache Tomcat

To copy the JDBC JAR on Apache Tomcat:

1. Download the required JAR from any source.
2. Navigate to the location where you have downloaded the *<Database_JAR>* file.
3. Copy the *Database_JAR* file to the following directory:
   - **On Apache Tomcat 5.5.x:** *TOMCAT_HOME*/common/lib/
   - **On Apache Tomcat 6.x and 7.x:** *TOMCAT_HOME*/lib/
4. Restart the server.

IBM WebSphere

To copy the JDBC JAR on IBM WebSphere:

1. Download the required JAR from any source, and then navigate to the location where you have downloaded it.
2. Log in to the WebSphere Administration Console.
3. Click **Environment,** and then click **Shared Libraries**.
   a. From the **Scope** list, select a valid visibility scope. The scope *must* include the target server or node on which the application is deployed.
   b. Click **New**.
   c. Enter the **Name**, say, **JDBCJAR**.
   d. Specify the **Classpath**.

      Important! This path *must* point to the location where the *<Database_JAR>* file is present and *must* include the file name.

   e. Click **Apply** to save the changes that were made.
4. Configure server-level class loaders.
   a. Click **Servers**, and then click **Application Servers.**

b. Under **Application Servers,** access the settings page of the server for which the configuration is performed.

c. Click **Java and Process Management**, and then click **Class Loader**.

d. Click **New**.

e. Select default **Classes loaded with parent class loader first** and click **OK.**

f. Click the auto-generated **Class Loader ID**.

g. In the class loader **Configuration** page, click **Shared Library References**.

h. Click **Add**, select **JDBCJAR** and then click **Apply**.

i. Save the changes that were made.

5. Restart the application server.

Oracle WebLogic

Note: If you are using Oracle Database, then do not perform the configurations in this section because WebLogic supports Oracle Database by default.

If you are using Microsoft SQL Server or MySQL, to copy the JDBC JAR on Oracle WebLogic:

1. Download the required JAR from any source, and then navigate to the location where you have downloaded it..
2. Copy the *Database_JAR* file to *Weblogic_JAVA_HOME*/jre/lib/**ext/**.

   Here, *WebLogic_JAVA_HOME* represents the JAVA_HOME used by your Oracle WebLogic instance.
3. Log in to the WebLogic Administration Console.
4. Navigate to **Deployments**.
5. Enable the **Lock and Edit** option.
6. Click **Install** and navigate to the directory that contains the required *<Database_JAR>* file.
7. Click **Next** to display the Application Installation Assistant page.
8. Click **Next** to display the Summary page.
9. Click **Finish**.
10. Activate the changes.
11. Restart the application server.

JBoss Application Server

To copy the JDBC JAR on JBoss Application Server:

1. Download the required JAR from any source, and then navigate to the location where you have downloaded it..
2. Copy the JDBC JAR file to the following location on the JBOSS installation directory: *JBOSS_HOME*/server/default/lib/
3. Restart the application server.

Step 4: (Mandatory for Oracle WebLogic 10.1) Creating Enterprise Archive Files

Most application servers enable you to bundle related JARs and WARs into a single enterprise application (or archive). As a result, all related JARs or WARs can be deployed together, and can be loaded by a class loader. Such an archive also contains an application.xml file, which is generated automatically and describes how to deploy each bundled module.

By default, WARs are provided to deploy UDS and Administration Console. However, you can also change the format of these files to EAR and then deploy the EAR files.

As discussed in the following sections, you can either generate separate EAR files for both UDS and Administration Console or you can generate a single EAR file that contains both the web archives.

Generating Separate EAR Files

To create a separate EAR files for the UDS and Administration Console:

1. Open the Command Prompt window.
2. Navigate to the *install_location*/arcot/tools/common/**bundlemanager**/ directory.
3. To create the EAR file, run the following command:
   `java -jar bundle-manager.jar -ear <filename.ear> -warList <filename.war>`

   The preceding command generates individual EAR files that are available at:
   install_location/arcot/**java**/**webapps**/

Generating a Single EAR File

To create a single EAR file that contains UDS and Administration Console Web archives:

1. Open the Command Prompt window.
2. Navigate to the <*install_location*>/arcot/tools/common/**bundlemanager**/ directory.
3. To create the EAR file, run the following command:
   `java -jar bundle-manager.jar -ear <filename.ear> -warList arcotadmin.war arcotuds.war`

   The preceding command generates a single EAR file that is available at:
   install_location/arcot/**java**/**webapps**/

Deploying Administration Console

Note: If you are deploying the Administration Console on IBM WebSphere 7.0, then see appendix, "Deploying Administration Console on IBM WebSphere 7.0" (see page 277) instead of the instructions in this section.

Administration Console is a browser-based interface to RiskMinder that enables you to customize the server configurations and manage the deployed system.

You need the **arcotadmin.war** file to deploy the RiskMinder Administration Console. All Administration Console information is logged in the arcotadmin.log file. After you deploy arcotadmin.war, you can verify if it was correctly deployed by using this (arcotadmin.log) log file. This log file is in the $ARCOT_HOME/arcot/logs directory.

Note: To manage RiskMinder by using Administration Console, ensure that Administration Console can access the system where RiskMinder Server is installed by its hostname.

To deploy the Administration Console WAR file on your application server and verify that it was successfully deployed:

1. Change the working directory to:
   `<install_location>/arcot/sbin`
2. Type source arrfenv and press **Enter** to set the Arcot environment variable.
3. Restart the application server for the changes to take effect.
4. Deploy arcotadmin.war in the appropriate directory on the application server.

   Note: The deployment procedure depends on the application server that you are using. Refer to your application server vendor documentation for detailed instructions.
   For example, in the case of Apache Tomcat, you must deploy the WAR file at <*APP_SERVER_HOME*>/**webapps**/.
5. **(For 32-bit WebSphere Only)** Configure reload of the Admin class when the application files are updated.
   a. Navigate to Application, Enterprise Applications, and then access the Admin settings page.
   b. Under Class loader order, select the Classes loaded with local class loader first (parent last) option.
   c. Under WAR class loader policy, select the Single class loader for application.
   d. Click Apply.
   e. Restart the Admin application.
6. **(For JBoss Only)** Perform the following steps if you have deployed Administration Console on JBoss Application Server:

a. Copy the Bouncy Castle JAR file (bcprov-jdk15-146.jar) from <*install_location*>/arcot/java/**lib**/ *to* the following location:
<*JBOSS_HOME*>/common/lib/

b. Navigate to the following location:
<*JBOSS_HOME*>/server/default/conf/

c. Open jboss-log4j.xml file in a text editor.

d. Add the following log configuration in the <log4j:configuration> section:

```
<appender name="arcotadminlog"
class="org.apache.log4j.RollingFileAppender">
<errorHandler
class="org.jboss.logging.util.OnlyOnceErrorHandler"></errorHandler>
<param name="Threshold" value="INFO"/>
<param name="MaxFileSize" value="10MB"/>
<param name="MaxBackupIndex" value="100"/>
<param name="Encoding" value="UTF-8"/>
<param name="Append" value="true"/>
<param name="File" value="${arcot.home}/logs/arcotadmin.log"/>
<layout class="org.apache.log4j.PatternLayout">
<param name="ConversionPattern" value="%d{yyyy-MM-dd hh:mm:ss,SSS z} : [%t]
: %-5p : %-5c{3} : %m%n"/>
</layout>
<filter class="org.jboss.logging.filter.TCLMCFilter">
<param name="AcceptOnMatch" value="true"/>
<param name="DeployURL" value="arcotadmin.war"/>
</filter>
<!-- end the filter chain here -->
<filter class="org.apache.log4j.varia.DenyAllFilter"></filter>
</appender>
```

e. Add the following log category:

```
<category name="com.arcot">
<priority value="INFO" />
<appender-ref ref="arcotadminlog"></appender-ref>
</category>
```

f. Add the following category for cryptographic operations:

```
<category name="com.arcot.crypto.impl.NCipherCrypter">
<priority value="FATAL" />
<appender-ref ref="arcotadminlog"></appender-ref>
</category>
```

g. Save and close the file.

h. Take a backup of the existing JBoss logging libraries. These library files are available at:
<*JBOSS_HOME*>/lib/

i. Upgrade the JBoss logging libraries available at <*JBOSS_HOME*>/lib/ to version 2.1.1. The following table lists the JAR file names and the location from where you can download the files.

File Name	Location
jboss-logging-jdk-2.1.1.GA.jar	*http://repo1.maven.org/maven2/org/jboss/logging/jboss-logging-jdk/2.1.1.GA/*
jboss-logging-spi-2.1.1.GA.jar	*http://repo1.maven.org/maven2/org/jboss/logging/jboss-logging-spi/2.1.1.GA/*
jboss-logging-log4j-2.1.1.GA.jar	*http://repo1.maven.org/maven2/org/jboss/logging/jboss-logging-log4j/2.1.1.GA/*

7. Restart the application server.
8. Verify that the console was successfully deployed:
   a. Navigate to the following location:
   `<install_location>/arcot/logs/`
   b. Open the arcotadmin.log file in any editor and locate the following lines:
      - 2.0.3
      - Arcot Administration Console Configured Successfully.

      These lines indicate that your Administration Console was deployed successfully.
   c. Also ensure that the log files *do not* contain any FATAL *and* WARNING messages.
   d. Close the file.

Logging In to Administration Console

When logging in to Administration Console for the first time, use the **Master Administrator** (MA) credentials that are configured automatically in the database during the installation.

To log in to Administration Console as MA:

1. Launch the Administration Console in a Web browser window. The default URL for Administration Console is:

   http://<host>:<appserver_port>/arcotadmin/masteradminlogin.htm

   Note: The *host* and *port* information that you specify in the preceding URL must be of the application server where you deployed Administration Console.
   For example, in case of Apache Tomcat, the default *host* is localhost and *port* is 8080.

2. Log in by using the default Master Administrator account credentials. The credentials are:

   - **User Name: masteradmin**
   - **Password: master1234!**

Bootstrapping the System

Before you start using Administration Console to manage RiskMinder, perform the following mandatory steps to initialize the system:

- Change the default Master Administrator password
- Configure the Global Key label
- Specify the configuration settings for the default organization

  Note: The Default Organization (DEFAULTORG) is created automatically when you deploy Administration Console. If you plan to use only one organization on the RiskMinder installation, then you can use the Default Organization itself. You need not create any other organization.

Bootstrapping is a wizard-driven process that walks you through these setup tasks. Other administrative links are enabled only after you perform these tasks.

Performing the Bootstrapping Tasks

When you first log in to Administration Console as the Master Administrator (MA), the Summary screen for the Bootstrap wizard screen appears.

To bootstrap the system by using the wizard:

1. Click Begin to start the process.

   The Change Password screen appears.

2. Specify the Current Password, New Password, Confirm Password, and click Next.

   The Configure Global Key Label screen appears.

3. On the Configure a Global Key Label page:

   - Specify the Global Key Label, and click Next.

     RiskMinder enables you to use hardware- or software-based encryption of your sensitive data. You can enable hardware-based encryption by using arcotcommon.ini (see page 204) file. Software-based encryption is enabled by default. Regardless of whether you use hardware or software encryption, all Advanced Authentication products use *Global Key Label* for encrypting user and organization data.

     If you are using hardware encryption, then this label serves only as a reference (or pointer) to the actual 3DES key stored in the HSM device, and therefore *must* match the HSM key label. However, in the case of software-based encryption, this label acts as the key.

     Caution: After you complete the bootstrapping process, you *cannot* update this key label.

   - Specify the Storage Type to indicate whether the encryption key is stored in the database (Software) or the HSM (Hardware).

4. Click Next to continue.

   The Configure Default Organization screen appears.

5. Under the **Default Organization Configuration** section, specify the following parameters for the Default Organization:

   - **Display Name:** The descriptive name of the organization. This name appears on all other Administration Console pages and reports.
   - **Administrator Authentication Mechanism:** The mechanism that is used to authenticate administrators who belong to the Default Organization. Administration Console supports three types of authentication methods for the administrators to log in:
     - **LDAP User Password**

       If you select this option, then the administrators are authenticated by using their credentials that are stored in the directory service.

Note: If this mechanism is used for authenticating administrators, then deploy UDS by following the instructions that are given in "Deploying User Data Service (UDS)" (see page 93).

- **Basic**

  If you select this option, then the built-in authentication method that is provided by Administration Console is used for authenticating the administrators.

- **WebFort Password**

  If you select the **WebFort Password** option here, then the credentials are issued and authenticated by the AuthMinder Server. For this option to work, you must also install CA AuthMinder.

  Note: See the *CA AuthMinder Installation and Deployment Guide* for more information about installing and configuring AuthMinder.

6. Under the **Key Label Configuration** section of the Configure Default Organization screen, specify the following values:

   - **Use Global Key:** This option is selected by default. Deselect this option if you want to override the Global Key Label you specified in the preceding step and specify a new label for encryption.
   - **Key Label:** If you deselected the **Use Global Key** option, then specify the new key label that you want to use for the Default Organization.
   - **Storage Type:** This field indicates whether the encryption key is stored in the database (Software) or the HSM (Hardware).

7. Click **Finish** to complete the bootstrapping process.

   Administration Console initialization is completed, as indicated in the Finish screen.

8. Click **Continue** to proceed with other configurations by using Administration Console.

Starting RiskMinder Server

To start RiskMinder Server:

1. If the required environment variables have not been set, run the following command:
   `source <install_location>/arcot/sbin/arrfenv`

   In this command, replace *<install_location>* with the path of the directory in which RiskMinder has been installed.

2. Navigate to the following directory:
   install_location/arcot/**bin**/

3. Run the ./riskfortserver start command.

   Note: If you want to stop RiskMinder Server, then navigate to the bin directory and enter the ./riskfortserver stop command.

Starting the Case Management Queuing Server

To start Case Management Server:

1. If the required environment variables have not been set, run the following command:
   `source <install_location>/arcot/sbin/arrfenv`

   In this command, replace *<install_location>* with the path of the directory in which RiskMinder has been installed.

2. Navigate to the following directory:
   install_location/arcot/**bin**/

3. Run the ./casemanagementserver start command.

   Note: If you want to stop Case Management Server, then navigate to the bin directory and enter the ./casemanagementserver stop command.

Deploying User Data Service (UDS)

RiskMinder can access user data either from a relational database (RDBMS) or directly from an LDAP server by using UDS, which is an abstraction layer that provides RiskMinder seamless access to the third-party data repositories deployed by your organization.

To deploy UDS:

1. Change the working directory to:
   install_location/arcot/**sbin**/
2. Type source arrfenv and press **Enter** to set the required environment variables.
3. Deploy arcotuds.war on the application server. This file is available at:
   install_location/arcot/java/webapps/

   For example, in the case of Apache Tomcat, deploy the WAR file at *APP_SERVER_HOME*/**webapps**/.

   Note: The deployment procedure depends on the application server that you are using. See the application server vendor documentation for detailed instructions.
4. (**For WebSphere Only**) Configure to reload the UDS class when the application files are updated.
   a. Navigate to **Application**, **Enterprise Applications** and access the UDS settings page.
   b. Under **Class loader order**, select the **Classes loaded with local class loader first (parent last)** option.
   c. Under **WAR class loader policy**, select the **Single class loader for application**.
   d. Click **Apply**.
5. **(For JBoss Only)** Perform the following steps if you have deployed UDS on a JBoss application server:
   a. Copy the Bouncy Castle JAR file (bcprov-jdk15-146.jar) from *install_location*/arcot/java/**lib**/ *to* the following location:
   JBOSS_HOME/common/lib/
   b. Navigate to the following location:
   JBOSS_HOME/server/default/conf/
   c. Open jboss-log4j.xml file in a text editor.
   d. Add the following log configuration in the <log4j:configuration> section:

```
<appender name="arcotudslog" class="org.apache.log4j.RollingFileAppender">
<errorHandler
class="org.jboss.logging.util.OnlyOnceErrorHandler"></errorHandler>
<param name="Threshold" value="INFO"/>
<param name="MaxFileSize" value="10MB"/>
<param name="MaxBackupIndex" value="100"/>
<param name="Encoding" value="UTF-8"/>
```

```
<param name="Append" value="true"/>
<param name="File" value="${arcot.home}/logs/arcotuds.log"/>
<layout class="org.apache.log4j.PatternLayout">
<param name="ConversionPattern" value="%d{yyyy-MM-dd hh:mm:ss,SSS z} : [%t]
: %-5p : %-5c{3}(%L) : %m%n"/>
</layout>
<filter class="org.jboss.logging.filter.TCLMCFilter">
<param name="AcceptOnMatch" value="true"/>
<param name="DeployURL" value="arcotuds.war"/>
</filter>
<!-- end the filter chain here -->
<filter class="org.apache.log4j.varia.DenyAllFilter"></filter>
</appender>
```

e. Add the following line in the com.arcot category that you created while Deploying Administration Console:
`<appender-ref ref="arcotudslog"></appender-ref>`

f. Add the following line in the cryptographic category that you created while Deploying Administration Console:
`<appender-ref ref="arcotudslog"></appender-ref>`

g. Save and close the file.

6. Restart the application server.

7. Verify if UDS was deployed successfully:

   Note: The arcotuds.log file is used for logging UDS-related information.

   a. Navigate to the following location:
   install_location/arcot/**logs**/

   b. Open the arcotuds.log file in any editor and locate the following line:

      - User Data Service (Version: 2.0.3) initialized successfully.

      This line indicates that UDS was deployed successfully.

   c. Also ensure that the log files *do not* contain any FATAL *and* WARNING messages.

   d. Close the file.

Deploying Sample Application

Important! Sample Application must *not* be used in production deployments. It is recommended that you build your own web application by using Sample Application as a code-reference.

Sample Application can be used to verify if RiskMinder was installed and configured properly. In addition, it demonstrates:

- The typical RiskMinder workflows
- The basic operations (invocation and post-processing) of RiskMinder APIs
- Integration of your application with RiskMinder

Sample Application is automatically installed as a part of Complete installation of RiskMinder. To deploy Sample Application:

1. Deploy the riskfort-3.1.01-sample-application.war file from the following location: *install_location*/arcot/samples/java/
2. Restart the application server, if necessary.
3. Access Sample Application in a Web browser window. The default URL for Sample Application is: *http://<host>:<appserver_port>/riskfort-3.1.01-sample-application/index.jsp*

Verifying the Installation

After you have seeded the database schema, deployed UDS and Administration Console, and bootstrapped the system, and started the Server, ensure that all these components have started correctly. Use the arcotriskfortstartup.log file for this purpose.

To verify that the server started correctly, follow these steps:

1. Navigate to the following location:
   install_location/arcot/**logs**/
2. Open the arcotriskfortstartup.log file in any editor and locate the following lines:
   - **For Solaris:** STARTING Arcot RiskFort 3.1.01_s
   - **For RHEL:** STARTING Arcot RiskFort 3.1.01_l
   - Arcot RiskFort Service READY
3. Open the arcotriskfortcasemgmtserverstartup.log file in any editor and locate the following lines:
   - **For Solaris:** STARTING Arcot RiskFort Case Management 3.1.01_s
   - **For RHEL:** STARTING Arcot RiskFort Case Management 3.1.01_l
   - Arcot RiskFort Case Management Service READY

Note: Also ensure that the log files do not contain any FATAL and WARNING messages.

Using Sample Application

The following sections describe the risk-evaluation operations that can be performed by using Sample Application. Each of these operations is designed to run without error when RiskMinder is completely installed and functional.

- Performing Risk Evaluation and Post Evaluation for a First-Time User (see page 97)
- Creating Users (see page 98)
- Performing Risk Evaluation and Post Evaluation for a Known User (see page 99)
- Editing the Default Profile and Performing Risk Evaluation (see page 100)

Performing Risk Evaluation and Post Evaluation for a First-Time User

To perform risk evaluation on the default profile of a user:

1. Ensure that Sample Application is open (in a Web browser window.) The default URL for Sample Application is:

   http://<host>:<appserver_port>/riskfort-3.1.01-sample-application/index.jsp

2. Click Evaluate Risk to open the Risk Evaluation page.
3. On the page, specify the name of the user (who you want to evaluate) in the User Name field.
4. (Optional) Specify the name of the organization to which the user belongs in the User Organization field.
5. (Optional) Specify the Channel from which the transaction originated.
6. Click Evaluate Risk to open the Risk Evaluation Results page.

   This page displays the Risk Score, the associated Risk Advice, and lists the rules that are configured for the specified organization. For a first-time user, the result is ALERT.

7. Click Next Step to open the Post Evaluation page and perform post-evaluation on the specified user profile.

   By using post-evaluation, your application provides feedback to RiskMinder Server about the current user and/or the device that they are using. Based on this feedback, RiskMinder updates the user and/or device attributes and the user-device association. It then assesses the risk associated with future transactions conducted by the user.

8. Select the result of secondary authentication by selecting the appropriate option from the Result of Secondary Authentication list.
9. Specify the name for the user name-device association in the Association Name field.
10. Click Post Evaluate to complete the post evaluation process and to display the result in the Post Evaluation Results section.

Creating Users

To create a user:

1. Create a GA account:
    a. Log in to Administration Console as the MA.
    b. Ensure that the **Users and Administrators** tab is active.
    c. In the left pane, click the **Create Administrator** link to display the Create Administrator page.
    d. Specify the details on the page and click **Next**.
    e. On the Create Administrator page, select **Global Administrator** from the **Role** list.
    f. Specify the **Password** and **Confirm Password**.
    g. Select the **All Organizations** option in the **Manages** section.
    h. Click **Create**.
    i. Click **Logout** in the top right-hand corner of the page to log out as the MA.
2. Log in to Administration Console as a Global Administrator (GA) or an Organization Administrator (OA). The URL for the purpose is:

    http://<host>:<appserver_port>/arcotadmin/adminlogin.htm
3. Follow the instructions that are displayed to change your password.
4. If it is not already activated, activate the **Manage Users and Administrators** sub-tab under the **Users and Administrators** tab.
5. In the left pane, under **Manage Users and Administrators**, click **Create User** to open the Create User page.
6. On the Create User page:
    a. Enter a unique user name, their organization name, and optionally, other user information in the **User Details** section.
    b. (Opitonal) Specify other user information in the corresponding fields on the page.
    c. Select the required **User Status**.
    d. Click **Create User.**

    The "Successfully created the user." message appears if the specified user was successfully added to the database.
7. Return to the RiskFort Sample Application page.

Performing Risk Evaluation and Post Evaluation for a Known User

To perform risk evaluation and post evaluation for a known user:

1. On the Main Page of Sample Application, click **Evaluate Risk** to open the Risk Evaluation page.
2. In the **User Name** field, specify the name of the user that you created in the section, "Creating Users" (see page 98).
3. Specify the user's organization in the **User Organization** field.
4. (Optional) Specify the **Channel** from which the transaction originated.
5. Click **Evaluate Risk** to open the Risk Evaluation Results page.

   The Risk Advice typically is **INCREASEAUTH**.
6. Click **Store DeviceID** to store the specified type of Device ID information about the end user's device.
7. Click **Next Step** to perform Post Evaluation:
   - Select the **Result of Secondary Authentication** from the list.
   - (Optional) Edit the **Association Name**.
8. Click **Post Evaluate** to display the final advice.

   If you repeat Step 1 through Step 5, the **Risk Advice** will change to **ALLOW** on the Risk Evaluation Results page.

Editing the Default Profile and Performing Risk Evaluation

Using Sample Application, you can change the DeviceDNA, IP address, and the Device ID of the computer that you are using to simulate various scenarios. To edit the default profile of a user:

1. On the Main Page of Sample Application, click **Evaluate Risk** to open the Risk Evaluation page.
2. Specify the user name whose profile you want to edit in the **User Name** field.
3. Specify the user's organization in the **User Organization** field.
4. Click **Edit Inputs** to open the Edit Risk-Evaluation Inputs page.
5. On the page, all fields are pre-populated. Change the values for one or more of the required fields:
   - My User Name
   - My Org
   - My Channel
   - Machine Finger Print of My Device
   - Short Form of Machine Finger Print of My Device
   - IP Address of My Machine
   - Device ID of My Machine
6. Click **Evaluate Risk** to open the Risk Evaluation Results page.
7. Click **Next Step** to open the Post Evaluation page and perform post-evaluation on the specified user profile.
8. Select the result of secondary authentication by selecting the appropriate option from the **Result of Secondary Authentication** list.
9. Click **Post Evaluate** to complete post evaluation and display the result of the same.

Note: To ensure secure communication between RiskMinder components, you can configure them to support SSL transport mode. See *chapter, "Configuring SSL"* for more information.

Applying the Post-Installation Checklist

Use the following checklist to note down installation and setup information for RiskMinder. This information is useful when performing various administrative tasks later.

Your Information	Example Entry	Your Entry
ARCOT_HOME	/var/opt/arcot/	

Your Information	Example Entry	Your Entry
SYSTEM INFORMATION		
Host Name	my-bank	
User Name	administrator	
Password	password1234!	
Configured Components	RiskFort Server Administration Console User Data Service	
ADMINISTRATION CONSOLE INFORMATION		
Host Name	localhost	
Port	8080	
Master Administrator Password	mypassword1234!	
USER DATA SERVICE INFORMATION		
Host Name	localhost	
Port	8080	
Application Context Root	arcotuds	

Chapter 5: Deploying RiskMinder on a Distributed System

Use the Arcot RiskFort 3.1.01 InstallAnywhere Wizard to install RiskMinder components. This Wizard supports Complete and Custom installation types. To install and configure RiskMinder in a distributed environment, use the Custom option when you run the installer.

The following steps provide a quick overview of the process:

1. Run the RiskMinder installer to install RiskMinder Server and Administration Console and to configure them to access your SQL database. You can also choose to install the Web services on the same system.

   See "Installing on the First System" (see page 106) for installation instructions.

2. Execute the database scripts to create RiskMinder schema and database tables. Also ensure that the database setup was successful.

   See "Running Database Scripts" (see page 117) and "Verifying the Database Setup" (see page 117) for more information.

3. Copy to your application server the files that are required by UDS and Administration Console to function correctly.

   See "Preparing Your Application Server" (see page 118) for more information.

4. Deploy Administration Console on the application server and verify the deployment.

   See "Deploying Administration Console" (see page 125) for more information.

5. Log in to Administration Console with the Master Administrator credentials to initialize RiskMinder.

   See "Logging In to Administration Console" (see page 128) and "Bootstrapping the System" (see page 128) for more information.

6. Start RiskMinder Server and the Case Management Queuing Server, and verify if they start successfully.

   See "Starting RiskMinder Server" (see page 131), "Starting the Case Management Queuing Server" (see page 131), and "Verifying the Installation" (see page 134) for more information.

7. Deploy User Data Service (UDS) on the application server and verify the deployment.

   See "Deploying User Data Service (UDS)" (see page 132) for more information.

8. Install the Java SDKs and Web services on one or more systems.

   See "Installing on the Second System" (see page 135) for more information.

9. Deploy, configure, and use Sample Application to test RiskMinder configuration.

   Note: To install Sample Application *only*, ensure that you select only the **SDKs and Sample Application** option and proceed with the installation.

   See "Deploying Sample Application" (see page 136), "Configuring Sample Application for Communication with RiskMinder Server" (see page 137), and "Using Sample Application" (see page 138) for more information.

10. (Optional) To ensure secure communication between RiskMinder components, you can configure them to support SSL (Secure Sockets Layer) transport mode.

    Book: See *CA RiskMinder Administration Guide* for more information.

11. Complete the installation checklist.

    See "Post-Installation Checklist" (see page 142) for more information.

12. (Optional) Change the HSM settings that you specified during installation.

    See appendix, "Changing Hardware Security Module Information After the Installation" (see page 223) for more information.

Important Notes Related to Installation

Keep the following points in mind while installing RiskMinder either on a single system or in a distributed environment:

- Ensure that the *<install_location> does not contain* any special characters (such as ~ ! @ # $ % ^ & * ( ) _ + = { }[ ] ’ ").
- The MySQL databse name should not contain dot (.) characters.
- Currently, you cannot modify or repair RiskMinder components by using the installer. You *must* uninstall the component and then re-install it.
- Do not close the installer window, if the installation is in progress. If at any time during installation (*especially during the last stages*), you click the **Cancel** button to abort the installation, then the installer may not remove *all* the directories it has created. Manually clean up the installation directory, <*install_location*>/**arcot/**, and its subdirectories.

- If you run the installer on a system that already contains an instance of an existing ARCOT_HOME, then:
  - You are *not* prompted for an installation directory.
  - You are *not* prompted for the database setup. The installer uses the existing database.
  - You are *not* prompted to set up encryption.
- It is equivalent to a custom installation.

Installing on the First System

In a distributed scenario, you typically install RiskMinder Server on the first system. *Custom installation* allows you to install only the selected components from the package. This option is recommended for advanced users.

Note: Before you begin the installation, ensure that all prerequisite software components are installed and the database is set up, as described in chapter, "Preparing for Installation" (see page 45).

Follow these steps:

1. Log in and navigate to the directory where you untarred the installer.
2. Ensure that you have the permissions required to run the installer. If not, run the following command:
   - **On Solaris:** chmod a=rx Arcot-RiskFort-3.1.01-Solaris-Installer.bin
   - **On Linux:** chmod a=rx Arcot-RiskFort-3.1.01-Linux-Installer.bin
3. Run the installer by typing the following command and then pressing Enter:
   - **For Solaris:**

     prompt> sh Arcot-RiskFort-3.1.01-Solaris-Installer.bin
   - **For Linux:**

     prompt> sh Arcot-RiskFort-3.1.01-Linux-Installer.bin

   Note: If you are running the installer with root login, then a warning message appears. Enter Y to continue, or enter N to quit the installation. If you exit the installer screen, then run the installer again.

   The Welcome screen appears.
4. Press Enter to continue with the installation.

   The License Agreement screen appears.
5. On the License Agreement screen:
   a. Carefully read the text and press **Enter** to display the next screen of the license text. You may have to press **Enter** multiple times, until the entire text for License Agreement is displayed.

      At the end of the license agreement, you will be prompted for acceptance of the terms of license agreement (**DO YOU ACCEPT THE TERMS OF LICENSE AGREEMENT?**).

   b. Enter **y** to accept the acceptance of License Agreement and to continue with the installation.

   Note: If you press **n**, then a warning message is displayed and the installation is aborted.

   The Choose Installation Location screen appears.

6. As directed on the screen, you can perform one of the following steps:
   - Specify the absolute path of the directory where you want to install RiskMinder and press **Enter** to continue.

     Note: The installation directory name that you specify *must not* contain any spaces. Otherwise, some RiskMinder scripts and tools may not function as intended.
   - Press **Enter** to accept the default directory that is displayed by the installer.

   The installer displays the installation options that are supported by RiskMinder.
7. **(Applicable only if you are installing on a system that already has an existing Advanced Authentication product installed)** The installer displays the following options:
   - **1** - Enter a new path.
   - **2** - Use the location at which the existing Advanced Authentication product is installed.
8. **(Applicable only if you are installing on a system that already has an existing Advanced Authentication product installed)** Select the required option and press **Enter** to continue with the installation.

   Note: If you selected option **1** or **2**, then a new directory named arcot is created in the specified location.

   The Installation Type screen appears. This screen displays the installation types (**Complete** and **Customize**) supported by RiskMinder.
9. Type **2** and press **Enter** to accept the **Customize** installation option and to continue with the installation.

   The Choose Product Features screen appears. This screen enables you to select the specific components that you want to install on the system.
10. Specify a comma-separated list (*without any space between the comma and the number*) of numbers representing the RiskMinder components you want to install and press **Enter** to continue.

    The following table describes all the components that are installed by the RiskMinder installer.

Option	Component	Description

Option	Component	Description
1	Arcot Risk Evaluation Server	This option installs the core Processing engine (**RiskMinder Server**) that serves the following requests from Administration Console: ■ Risk Evaluation ■ User Management ■ Configuration In addition, this component also installs the following Web services that have been built into the server: ■ **Risk Evaluation Web Service** - Provides the web-based programming interface for risk evaluation with RiskMinder Server. ■ **Administration Web Service** - Provides the web-based programming interface used by the RiskMinder Administration Console.
2	Arcot Case Management Queuing Server	This option installs the core Queuing engine (**Case Management Queuing Server**) that allocates cases to the Customer Support Representatives (CSRs) who work on these cases. **Note:** At any given point in time, *all* instances of Administration Console can only connect to this single instance of the Case Management Queuing Server.

Option	Component	Description
3	Arcot RiskFort SDKs and Sample Application	This option provides programming interfaces (in form of APIs and Web services) that can be invoked by your application to forward risk evaluation requests to RiskMinder Server. This package comprises the following sub-components: ■ **Risk Evaluation SDK** - Provides the Java programming interface for risk evaluation with RiskMinder Server. ■ **Sample Application** - Demonstrates the usage of RiskMinder Java APIs. In addition, it can also be used to verify if RiskMinder was installed successfully, and if it is able to perform risk evaluation requests. Refer to chapter, "Configuring RiskMinder SDKs and Web Services" (see page 143) for more information about configuring these components.
4	Arcot Administration Console	This option provides the Web-based interface for managing RiskMinder Server and risk evaluation-related configurations.
5	Arcot User Data Service	This option installs UDS that acts as an abstraction layer for accessing different types of user repositories, such as relational databases (RDBMSs) and directory servers (LDAPs.)

For example, to install RiskMinder Server, Case Management Queuing Server, and Administration Console (*without* the SDKs and Sample Application) on the current system, you specify:

1,2,4,5

Note: If the Server component was not selected for installation on this screen, then the screens in Step 11 through Step 16 are not shown.

The Database Type screen appears. This screen lists the database types that are supported by RiskMinder.

Note: If you are installing in a location where an Advanced Authentication product is already installed, then the installer uses the same database configuration as the installed product. As a result, the screens in Step 11 through Step 15 are not shown.

1. Specify the number corresponding to your choice of database, and press Enter to continue:
   - **1** - Microsoft SQL Server
   - **2** - Oracle Database
   - **3** - MySQL

   The Primary Database Access Configuration screen appears.

   Note: CA RiskMinder release 3.1.01 is now certified to work with Oracle Real Application Clusters (Oracle RAC). To use Oracle RAC with your RiskMinder Installation, select Oracle Database in this step, perform the next step (Step 12), and then perform the steps in Configuring CA RiskMinder for Oracle RAC (see page 253).

2. On the Primary Database Access Configuration screen:
   - Specify the information that is listed in the following table if you specified **1** (SQL Server) in the preceding step.

Parameter	Description
Primary ODBC DSN	The installer creates the DSN by using this value. RiskMinder Server uses then this DSN to connect to the RiskMinder database. The recommended value to enter is arcotdsn. **Note:** Database Source Name (DSN) specifies the information that is required to connect to a database by using an ODBC driver. This information includes database name, directory, database driver, User ID, and password.

Parameter	Description
User Name	The database user name for RiskMinder to access the database. This name is specified by the database administrator. (MS SQL Server, typically, refers to this as login.) **Note:** The User Name for the Primary and Backup DSNs *must* be different.
Password	The password associated with the User Name you specified in the previous field and which is used by RiskMinder to access the database. This password is specified by the database administrator.
Server Name	The host name or IP address of the RiskMinder datastore. ■ Default Instance **Syntax**: *<server_name>* **Example**: demodatabase
Database	The name of the MS SQL database instance.

- Specify the information that is listed in the following table if you specified **2** (Oracle) in the preceding step.

Parameter	Description
Primary ODBC DSN	The installer creates the DSN by using this value. RiskMinder Server uses then this DSN to connect to the RiskMinder database. The recommended value to enter is arcotdsn. **Note:** Database Source Name (DSN) specifies the information that is required to connect to a database by using an ODBC driver. This information includes database name, directory, database driver, User ID, and password.
User Name	The database user name for RiskMinder to access the database. This name is specified by the database administrator. **Note:** The User Name for the Primary and Backup DSNs *must* be different.
Password	The password associated with the **User Name** you specified in the previous field and which is used by RiskMinder to access the database. This password is specified by the database administrator.

Parameter	Description
Service ID	The Oracle System Identifier (SID) that refers to the instance of the Oracle database running on the server.
Port No	The port at which the database listens to the incoming requests. **Note:** Press **Enter**, if you want to accept the default port.
Host Name	The host name or IP address of the RiskMinder datastore. **Syntax**: *<server_name>* **Example**: demodatabase

- Specify the information that is listed in the following table if you specified **3** (MySQL) in the preceding step.

Parameter	Description
Primary ODBC DSN	The installer creates the DSN by using this value. RiskMinder Server uses then this DSN to connect to the RiskMinder database. The recommended value to enter is arcotdsn. **Note:** Database Source Name (DSN) specifies the information that is required to connect to a database by using an ODBC driver. This information includes database name, directory, database driver, User ID, and password.
User Name	The database user name for RiskMinder to access the database. This name is specified by the database administrator. **Note:** The User Name for the Primary and Backup DSNs *must* be different.
Password	The password associated with the User Name you specified in the previous field and which is used by RiskMinder to access the database. This password is specified by the database administrator.
Server Name	The host name or IP address of the RiskMinder datastore. ■ Default Instance **Syntax**: *<server_name>* **Example**: demodatabase ■ Named Instance **Syntax**: *<server_name>**<instance_name>* **Example**: demodatabase\instance1

Parameter	Description
Database	The name of the MySQL database instance.

The screen to configure backup database access appears.

1. On the backup database access configuration screen, perform one of the following steps:
   - Type **N** to skip the configuration of the secondary DSN, when prompted, and press **Enter** to continue to the next screen.
   - Type **Y** to configure the secondary DSN, when prompted, and press **Enter** to continue.

     See the tables in the previous step for database-specific information about the tasks to be performed.
2. Press **Enter** to continue.

   The Encryption Configuration screen appears. Use this screen to select the encryption mode and configure the information that is used for encryption.
3. Specify the following information and press **Enter** to continue:

Field Name	Description
Master Key	Specify the password for the Master Key, which is stored at *<install_location>*/arcot/conf/securestore.enc and will be used to encrypt the data stored in the database. By default, this value is set to MasterKey. **Note:** If you want to change the value of Master Key *after* the installation, then regenerate securestore.enc with a new Master Key value. See appendix, "Changing Hardware Security Module Information After the Installation" (see page 223) for more information.
Do you want to configure HSM Module?	Enter **y** if you want to use a Hardware Security Module (HSM) to encrypt the sensitive data or enter n to use the software encryption. If you do not select this option, then, by default, the data is encrypted by using the Software Mode.
Choose Hardware Module	Choose one of the following HSMs that you plan to use: ■ 1 - Luna HSM ■ 2 - nCipher netHSM
HSM PIN	Enter the password to connect to the HSM.

Field Name	Description
Note: The HSM parameter values are recorded in arcotcommon.ini at <*install_location*>/arcot/conf. To change these values *after* installation, edit this file by following the instructions given in appendix, "Configuration Files and Options" (see page 201).	Set the following HSM information: ■ **Shared Library:** The absolute path to the PKCS#11 shared library corresponding to the HSM. For Luna (libCryptoki2.so) and for nCipher netHSM (libcknfast.so), specify the absolute path and name of the file. ■ **Storage Slot Number:** The HSM slot where the 3DES keys used for encrypting the data are available. The default value for **Luna** is 0, and for **nCipher netHSM** the default value is 1.

The Pre-Installation Summary screen appears. This screen lists the product details, installation directory, type of installation, and components that are to be installed.

1. Carefully review the product details displayed and press **Enter** to proceed with the installation. If you would like to change a configuration on any of the previous screens, type **back** until you reach the screen, make the required changes, and press **Enter** to proceed to the next screen.

   The Installing screen appears. This may take several minutes, because the installer now:

   - Copies all the components and their related binaries in the installation directory.
   - Stores database settings in the arcotcommon.ini (see page 204) file and the password in the securestore.enc file.
   - Writes to the required INI files.
   - Sets the environment variables such as, JNI_LIBRARY_PATH for Administration Console and ODBC_HOME, ODBCINI, ORACLE_HOME, and ORACLE_LIB_PATH in the arrfenv file.
   - Creates or overwrites, as specified in a previous screen, the Primary DSN and Backup DSN (if selected and configured) by using the selected ODBC driver in the odbc.ini file.

   After the preceding tasks are completed successfully, the Installation *Complete* screen appears.

2. Press **Enter** to exit the installer.

   You may have to wait for a few minutes (for the installer to clean up temporary files) until the prompt re-appears.

3. Check the installation log file (Arcot_RiskFort_Install_<*timestamp*>.log), which is available in the <*install_location*>/**arcot**/ directory.

4. Ensure that UTF-8 support is enabled:

   a. Navigate to the <*install_location*>/arcot/odbc32v70wf/odbc.ini file.

   b. Locate the [ODBC] section.

   c. Ensure that the IANAAppCodePage=106 entry is present in the section.

   d. If you do not find this entry, then add it.

   e. Save and close the file.

Note: After the installation is completed, perform the post-installation tasks that are discussed in "Performing Post-Installation Tasks on the First System" (see page 116).

Installation Logs

After installation, you can access the installation log file (Arcot_RiskFort_Install_*<timestamp>*.log) in the *<install_location>* directory. For example, if you had specified the /opt directory as the installation directory, then the installation log file is created in the /opt directory.

If the installation fails for some reason, then error messages are recorded in this log file.

Performing Post-Installation Tasks on the First System

This section guides you through the post-installation tasks that you must perform after installing RiskMinder on the first system. These steps are required for configuring RiskMinder correctly and must be *performed in the following order*:

1. Running Database Scripts (see page 117)
2. Verifying the Database Setup (see page 117)
3. Preparing Your Application Server (see page 118)
4. Deploying Administration Console (see page 125)
5. Logging In to Administration Console (see page 128)
6. Bootstrapping the System (see page 128)
7. Starting RiskMinder Server (see page 131)
8. Starting the Case Management Queuing Server (see page 131)
9. Deploying User Data Service (UDS) (see page 132)
10. Verifying the Installation (see page 134)

Note: After completing these post-installation tasks, perform the SDK and Web services configuration tasks that are discussed in chapter, "Configuring RiskMinder SDKs and Web Services" (see page 143).

Running Database Scripts

Important! Before you run the scripts that are discussed in this section, ensure that you are logged in as the database user that you created in "Configuring Database Server" (see page 54).

RiskMinder is shipped with scripts that are required to create necessary tables in the RiskMinder database. To run the required database scripts:

1. Navigate to the following directory:
   `<install_location>/arcot/dbscripts/`
2. Based on the database that you are using, navigate to one of the following subdirectories:
   - **For Oracle Database**: oracle/
   - **For Microsoft SQL Server**: mssql/
   - **For MySQL**: mysql/
3. Run the scripts *in the following order*:
   a. arcot-db-config-for common-2.0.sql

      Important! If you have installed CA AuthMinder 7.1.01, you do not have to run arcot-db-config-for-common-2.0.sql because you have already run it while installing CA AuthMinder 7.1.01.

   b. arcot-db-config-for-riskfort-3.1.01.sql

   c. (Optional, only if you want to create the 3D Secure Channel) arcot-db-config-for-3dsecure-3.1.01.sql

Verifying the Database Setup

After you run the required database scripts, verify whether the RiskMinder schema is seeded correctly. To do so:

1. Log in to the RiskMinder database as the user who installed the database.

   Note: If you are following the upgrade path, then log in to the database as the user who upgraded the database.

2. Run the following query:
   ```
   SELECT SERVERNAME, VERSION FROM ARRFSERVERS;
   ```
   You must see the following output as a result of the preceding query:
   ```
   SERVERNAME                    VERSION
   ------------------------  ----------------
   RiskFort                       3.1.01
   RiskFortCaseManagement         3.1.01
   ```
3. Log out of the database console.

Preparing Your Application Server

Two components of RiskMinder, User Data Service (UDS) and Administration Console, are web-based and can be deployed on any of the following supported application servers:

- Apache Tomcat
- IBM WebSphere
- Oracle WebLogic
- JBoss Application Server

Before you deploy the WAR files for these web applications on the application server of your choice, copy the files that are required by UDS and Administration Console to the appropriate location on your application server. This section describes the steps to copy the required crypto files to your application server and to deploy the WAR files of these web applications:

- Step 1: Setting Java Home (see page 118)
- Step 2: Copying Database Access Files to Your Application Server (see page 119)
- Step 3: Copying JDBC JAR Files to Your Application Server (see page 122)
- Step 4: (Mandatory for Oracle WebLogic 10.1) Creating Enterprise Archive Files (see page 124)

Step 1: Setting Java Home

Before you deploy the WAR files for UDS and Administration Console on the application server, ensure that you set the JAVA_HOME environment variable to the Java home directory of the application server.

In addition, $JAVA_HOME/**bin**/ must be added to the PATH variable. If you fail to do so, then Administration Console, UDS, and other JDK-dependent components may fail to start.

Step 2: Copying Database Access Files to Your Application Server

UDS and Administration Console use the following files to access the RiskMinder database securely:

- arcot-crypto-util.jar available at:
  install_location/arcot/**java**/**lib**/
- libArcotAccessKeyProvider.so available at:
  install_location/arcot/**native**/**<platform>**/<**32bit-or-64bit**>/

As a result, these files must be copied to the appropriate location on the application server where you have deployed these RiskMinder components. The following subsections provide information about copying these files for:

- Apache Tomcat
- IBM WebSphere
- Oracle WebLogic
- JBoss Application Server

Apache Tomcat

To copy the files that are required for database access:

1. Download the required JAR from any source.
2. Copy arcot-crypto-util.jar *to Tomcat_JAVA_HOME*/jre/lib/**ext**/.

   Here, *Tomcat_JAVA_HOME* represents the JAVA_HOME used by your Apache Tomcat instance.
3. Copy libArcotAccessKeyProvider.so *to*:
   - **For Solaris:** *Tomcat_JAVA_HOME*/jre/**bin**/
   - **For RHEL:** *Tomcat_JAVA_HOME*/jre/**bin**/
4. Set and export the LD_LIBRARY_PATH to the directory where the libArcotAccessKeyProvider.so file is copied.
5. Restart the application server.

IBM WebSphere

To copy the files that are required for database access:

1. Download the required JAR from any source, and navigate to the location where you have downloaded it.
2. Log in to WebSphere Administration Console.
3. Click **Environment,** and then click **Shared Libraries**.
   a. From the **Scope** drop-down, select a valid visibility scope. The scope must include the target server or node on which the application is deployed.

b. Click **New**.

c. Enter the **Name**, for example, *ArcotJNI*.

d. Specify the **Classpath**.

This path must point to the location where the arcot-crypto-util.jar file is present and must also include the file name. For example, *install_location*/arcot/java/lib/**arcot-crypto-util.jar**.

e. Enter the JNI Library path.

This path must point to the location where the libArcotAccessKeyProvider.so file is present.

4. Click **Apply** to save the changes.
5. Configure the server-level class loaders.
   a. Click **Servers**, and then click **Application Servers.**
   b. Under **Application Servers**, access the settings page of the server for which the configuration must be performed.
   c. Click **Java and Process Management** and then click **Class Loader**.
   d. Click **New**.
   e. Select default **Classes loaded with parent class loader first** and click **OK.**
   f. Click the auto-generated **Class Loader ID**.
   g. On the class loader **Configuration** page, click **Shared Library References**.
   h. Click **Add**, select **ArcotJNI,** and then click **Apply**.
   i. Save the changes.
6. Copy libArcotAccessKeyProvider.so to:
   - **For Solaris:** *WebSphere_JAVA_HOME*/jre/**bin**/
   - **For RHEL:** *WebSphere_JAVA_HOME*/jre/**bin**/

   Here, *WebSphere_JAVA_HOME* represents the JAVA_HOME used by your IBM WebSphere instance.
7. Restart the application server.

Oracle WebLogic

To copy the files that are required for database access:

1. Download the required JAR from any source, and navigate to the location where you have downloaded it.
2. Copy libArcotAccessKeyProvider.so to WebLogic's:
   - **For Solaris:** *WebLogic_JAVA_HOME*/jre/**bin**/
   - **For RHEL:** *WebLogic_JAVA_HOME*/jre/**bin**/

Here, *WebLogic_JAVA_HOME* represents the JAVA_HOME used by your Oracle WebLogic instance.

3. Copy arcot-crypto-util.jar to *WebLogic_JAVA_HOME*/jre/lib/**ext**/.

   Note: Ensure that you use the appropriate *JAVA_HOME* used by WebLogic.

4. Log in to WebLogic Administration Console.
5. Navigate to **Deployments**.
6. Enable the **Lock and Edit** option.
7. Click **Install** and navigate to the directory that contains the arcot-crypto-util.jar file.
8. Click **Next** to open the Application Installation Assistant.
9. Click **Next** to display the Summary page.
10. Click **Finish**.
11. Activate the changes.
12. Set and export the LD_LIBRARY_PATH to the directory where the libArcotAccessKeyProvider.so file is copied.
13. Restart the application server.

JBoss Application Server

To copy the files that are required for database access:

1. Download the required JAR from any source, and navigate to the location where you have downloaded it.
2. Copy libArcotAccessKeyProvider.so *to:*
   - **For Solaris:** <*JBoss_JAVA_HOME*>/jre/**bin**/
   - **For RHEL:** <*JBoss_JAVA_HOME*>/jre/**bin**/

   Here, <*JBoss_JAVA_HOME*> represents the JAVA_HOME used by your JBoss Application Server instance.
3. Copy arcot-crypto-util.jar *to* <*JBoss_JAVA_HOME*>/jre/lib/**ext**/.
4. Set and export the LD_LIBRARY_PATH to the directory where the libArcotAccessKeyProvider.so file is copied.
5. Restart the application server.

Step 3: Copying JDBC JAR Files to Your Application Server

RiskMinder requires the following JDBC JAR files for the supported databases:

- **Oracle 10g:** Oracle JDBC Driver (10.2.0.1.0)
- **Oracle 11g:** Oracle JDBC Driver (11.2.0.2.0)
- **Microsoft SQL Server:** MSSQL JDBC Driver (1.2.2828)
- **MySQL:** MySQL JDBC Driver (5.1.22)

The following sections walk you through the steps for copying the JDBC JARs:

Apache Tomcat

To copy the JDBC JAR on Apache Tomcat:

1. Navigate to the location where you have downloaded the *<Database_JAR>* file.
2. Copy the *<Database_JAR>* file to the following directory:
   - **On Apache Tomcat 5.5.x:** *<TOMCAT_HOME>*/common/lib/
   - **On Apache Tomcat 6.x and 7.x:** *<TOMCAT_HOME>*/lib/
3. Restart the application server.

IBM WebSphere

To copy the JDBC JAR on IBM WebSphere:

1. Log in to the WebSphere Administration Console.
2. Click **Environment,** and then click **Shared Libraries**.
   a. From the **Scope** list, select a valid visibility scope. The scope *must* include the target server or node on which the application is deployed.
   b. Click **New**.
   c. Enter the **Name**, say, **JDBCJAR**.
   d. Specify the **Classpath**.

      Important! This path *must* point to the location where the *<Database_JAR>* file is present and *must* include the file name.

   e. Click **Apply**.
3. Configure server-level class loaders.
   a. Click **Servers**, and then click **Application Servers.**
   b. Under **Application Servers** access the settings page of the server for which the configuration is performed.
   c. Click **Java and Process Management**, and then click **Class Loader**.
   d. Click **New**.

e. Select default **Classes loaded with parent class loader first** and click **OK.**

f. Click the auto-generated **Class Loader ID**.

g. In the class loader **Configuration** page, click **Shared Library References**.

h. Click **Add**, select **JDBCJAR** and then click **Apply**.

i. Save the changes.

4. Restart the application server.

Oracle WebLogic

Note: If you are using Oracle Database, then you do not have to perform the configurations that are mentioned in this section because WebLogic supports Oracle Database by default.

If you are using Microsoft SQL Server or MySQL, to copy the JDBC JAR on Oracle WebLogic:

1. Copy the <*Database_JAR*> file to <*Weblogic_JAVA_HOME*>/jre/lib/**ext**/.

   Here, <*WebLogic_JAVA_HOME*> represents the JAVA_HOME used by your Oracle WebLogic instance.

2. Log in to the WebLogic Administration Console.
3. Navigate to **Deployments**.
4. Enable the **Lock and Edit** option.
5. Click **Install** and navigate to the directory that contains the required <*Database_JAR*> file.
6. Click **Next** to display the Application Installation Assistant page.
7. Click **Next** to display the Summary page.
8. Click **Finish**.
9. Activate the changes.
10. Restart the application server.

JBoss Application Server

To copy the JDBC JAR on JBoss Application Server:

1. Copy the JDBC JAR file to the following location on the JBoss installation directory: <*JBOSS_HOME*>/server/default/lib/
2. Restart the application server.

Step 4: (Mandatory for Oracle WebLogic 10.1) Creating Enterprise Archive Files

Most application servers enable you to bundle related JARs and WARs into a single enterprise application (or archive). As a result, all related JARs or WARs can be deployed together, and can be loaded by a class loader. This archive also contains an application.xml file, which is generated automatically and describes how to deploy each bundled module.

By default, WAR files are provided to deploy UDS and Administration Console. If necessary, you can also change the format of these files to EAR and then deploy the EAR files.

As discussed in the following subsections, you can either generate separate EAR files for both UDS and Administration Console, or you can generate a single EAR file that contains both web archives.

Generating Separate EAR Files

To create an EAR file each for UDS and Administration Console, follow these steps:

1. Open the Command Prompt window.
2. Navigate to the <*install_location*>/arcot/tools/common//**bundlemanager**/ directory.
3. To create the EAR file, run the following command:
   `java -jar bundle-manager.jar -ear <filename.ear> -warList <filename.war>`

   The preceding command generates individual EAR files that are available at:
   `<install_location>/arcot/java/webapps/`

Generating a Single EAR File

To create a single EAR file that contains UDS and Administration Console Web archives, follow these steps:

1. Open the Command Prompt window.
2. Navigate to the <*install_location*>/arcot/tools/common/**bundlemanager**/ directory.
3. To create the EAR file, run the following command:
   `java -jar bundle-manager.jar -ear <filename.ear> -warList arcotadmin.war arcotuds.war`

   The preceding command generates a single EAR file that is available at:
   `<install_location>/arcot/java/webapps/`

Deploying Administration Console

Note: If you are deploying the Administration Console on IBM WebSphere 7.0, then refer to the instructions in appendix, "Deploying Administration Console on IBM WebSphere 7.0" (see page 277) instead of the following instructions.

Administration Console is a browser-based interface to RiskMinder that enables you to customize the server configurations and manage the deployed system.

You need the **arcotadmin.war** file to deploy the RiskMinder Administration Console. All Administration Console information is logged in the arcotadmin.log file. After you deploy arcotadmin.war, you can verify if it was correctly deployed by using the arcotadmin.log log file. This log file is in the $ARCOT_HOME/arcot/logs directory.

Note: To manage RiskMinder by using Administration Console, ensure that Administration Console can access the system where RiskMinder Server is installed by its hostname.

To deploy the Administration Console WAR file on your application server and verify that it was successfully deployed:

1. Change the working directory to:
   `<install_location>/arcot/sbin`
2. Type source arrfenv and press **Enter** to set the Arcot environment variable.
3. Restart the application server for the changes to take effect.
4. Deploy arcotadmin.war in the appropriate directory on the application server.

   Note: The deployment procedure depends on the application server that you are using. Refer to your application server vendor documentation for detailed instructions.
   For example, in the case of Apache Tomcat, you must deploy the WAR file at <*APP_SERVER_HOME*>/**webapps/**.
5. **(For 32-bit WebSphere Only)** Configure reload of the Admin class when the application files are updated.
   a. Navigate to Application, Enterprise Applications, and then access the Admin settings page.
   b. Under Class loader order, select the Classes loaded with local class loader first (parent last) option.
   c. Under WAR class loader policy, select the Single class loader for application.
   d. Click Apply.
   e. Restart the Admin application.
6. **(For JBoss Only)** Perform the following steps if you have deployed Administration Console on JBoss Application Server:

a. Copy the Bouncy Castle JAR file (bcprov-jdk15-146.jar) from <*install_location*>/arcot/java/**lib**/ *to* the following location:
<*JBOSS_HOME*>/common/lib/

b. Navigate to the following location:
<*JBOSS_HOME*>/server/default/conf/

c. Open jboss-log4j.xml file in a text editor.

d. Add the following log configuration in the <log4j:configuration> section:

```
<appender name="arcotadminlog"
class="org.apache.log4j.RollingFileAppender">
<errorHandler
class="org.jboss.logging.util.OnlyOnceErrorHandler"></errorHandler>
<param name="Threshold" value="INFO"/>
<param name="MaxFileSize" value="10MB"/>
<param name="MaxBackupIndex" value="100"/>
<param name="Encoding" value="UTF-8"/>
<param name="Append" value="true"/>
<param name="File" value="${arcot.home}/logs/arcotadmin.log"/>
<layout class="org.apache.log4j.PatternLayout">
<param name="ConversionPattern" value="%d{yyyy-MM-dd hh:mm:ss,SSS z} : [%t]
: %-5p : %-5c{3} : %m%n"/>
</layout>
<filter class="org.jboss.logging.filter.TCLMCFilter">
<param name="AcceptOnMatch" value="true"/>
<param name="DeployURL" value="arcotadmin.war"/>
</filter>
<!-- end the filter chain here -->
<filter class="org.apache.log4j.varia.DenyAllFilter"></filter>
</appender>
```

e. Add the following log category:

```
<category name="com.arcot">
<priority value="INFO" />
<appender-ref ref="arcotadminlog"></appender-ref>
</category>
```

f. Add the following category for cryptographic operations:

```
<category name="com.arcot.crypto.impl.NCipherCrypter">
<priority value="FATAL" />
<appender-ref ref="arcotadminlog"></appender-ref>
</category>
```

g. Save and close the file.

h. Take a backup of the existing JBoss logging libraries. These library files are available at:
<*JBOSS_HOME*>/lib/

i. Upgrade the JBoss logging libraries available at <*JBOSS_HOME*>/lib/ to version 2.1.1. The following table lists the JAR file names and the location from where you can download the files.

File Name	Location
jboss-logging-jdk-2.1.1.GA.jar	*http://repo1.maven.org/maven2/org/jboss/logging/jboss-logging-jdk/2.1.1.GA/*
jboss-logging-spi-2.1.1.GA.jar	*http://repo1.maven.org/maven2/org/jboss/logging/jboss-logging-spi/2.1.1.GA/*
jboss-logging-log4j-2.1.1.GA.jar	*http://repo1.maven.org/maven2/org/jboss/logging/jboss-logging-log4j/2.1.1.GA/*

7. Restart the application server.
8. Verify that the console was successfully deployed:
   a. Navigate to the following location:
   `<install_location>/arcot/logs/`
   b. Open the arcotadmin.log file in any editor and locate the following lines:
      - 2.0.3
      - Arcot Administration Console Configured Successfully.

      These lines indicate that your Administration Console was deployed successfully.
   c. Also ensure that the log files *do not* contain any FATAL *and* WARNING messages.
   d. Close the file.

Logging In to Administration Console

When logging in to Administration Console for the first time, use the **Master Administrator** (MA) credentials that are configured automatically in the database during the deployment.

To log in to Administration Console as MA:

1. Launch the Administration Console in a Web browser window. The default URL for Administration Console is:

   http://host_name:appserver_port/arcotadmin/masteradminlogin.htm

   Note: The *host* and *port* information that you specify in the preceding URL must be of the application server where you deployed Administration Console.
   For example, in case of Apache Tomcat, the default *host* is localhost and *port* is 8080.

2. Log in by using the default Master Administrator account credentials. The credentials are:

   - **User Name: masteradmin**
   - **Password: master1234!**

Bootstrapping the System

Before you start using Administration Console to manage RiskMinder, perform the following steps to initialize the system:

- Change the default Master Administrator password
- Configure the Global Key label
- Specify the configuration settings for the out-of-the-box organization

  Note: When you deploy Administration Console, the Default Organization (DEFAULTORG) is created automatically. If you plan to use only one organization on the RiskMinder installation, you can use the Default Organization itself. You do not have to create any other organization.

Bootstrapping is a wizard-driven process that walks you through these setup tasks. Other administrative links are enabled only after you perform these tasks.

Performing Bootstrapping Tasks

When you first log in to Administration Console as the Master Administrator (MA), the Summary screen for the Bootstrap wizard screen appears.

To bootstrap the system by using the wizard:

1. Click Begin to start the process.

   The Change Password screen appears.

2. Specify the Current Password, New Password, Confirm Password, and click Next.

   The Configure Global Key Label screen appears.

3. On the Configure a Global Key Label page:

   - Specify the Global Key Label.

     RiskMinder enables you to use hardware- or software-based encryption of your sensitive data. You can enable hardware-based encryption by using the arcotcommon.ini (see page 204) file. Software-based encryption is enabled by default. Regardless of whether you select hardware- or software-based encryption, all Advanced Authentication products use *Global Key Label* for encrypting user and organization data.

     If you select hardware-based encryption, then this label serves only as a reference (or pointer) to the actual 3DES key stored in the HSM device, and therefore *must* match the HSM key label. In the case of software-based encryption, this label acts as the key.

     Caution: After you complete the bootstrapping process, you *cannot* update this key label.

   - Specify the **Storage Type** to indicate whether the encryption key is stored in the database (Software) or the HSM (Hardware).

4. Click **Next** to continue.

   The Configure Default Organization screen appears.

5. Under the Default Organization Configuration section, specify the following parameters for the Default Organization:

   - Display Name: The descriptive name of the organization. This name appears on all other Administration Console pages and reports.
   - Administrator Authentication Mechanism: The mechanism that is used to authenticate administrators who belong to the Default Organization. Administration Console supports three types of authentication methods for the administrators to log in:
     - LDAP User Password

       If you select this option, then the administrators are authenticated by using their credentials that are stored in the directory service.

Note: If this mechanism is used for authenticating administrators, then deploy UDS by performing the procedure that is described in Deploying User Data Service (UDS) (see page 132).

- **Basic**

  If you select this option, then the built-in authentication method that is provided by Administration Console is used for authenticating the administrators.

- **WebFort Password**

  If you select this option, then the credentials are issued and authenticated by the AuthMinder Server. To use this feature, install the CA AuthMinder Server.

Book: See the *CA AuthMinder Installation and Deployment Guide* for more information about installing and configuring AuthMinder.

6. Under the Key Label Configuration section of the Configure Default Organization screen, specify the following values:

   - **Use Global Key:** This option is selected by default. Deselect this option if you want to override the Global Key Label you specified in the preceding step and specify a new label for encryption.
   - **Key Label:** If you deselected the Use Global Key option, then specify the new key label that you want to use for the Default Organization.
   - **Storage Type:** This field indicates whether the encryption key is stored in the database (Software) or the HSM (Hardware).

7. Click Finish to complete the bootstrapping process.

   The Administration Console initialization is completed, as indicated in the Finish screen.

8. Click **Continue** to proceed with other configurations by using Administration Console.

Starting RiskMinder Server

To start RiskMinder Server:

1. If the required environment variables have not been set, run the following command:
   `source <install_location>/arcot/sbin/arrfenv`

   In this command, replace *<install_location>* with the path of the directory in which RiskMinder has been installed.
2. Navigate to the following directory:
   install_location`/arcot/`**`bin`**`/`
3. Run the ./riskfortserver start command.

Note: If you want to stop RiskMinder Server, then navigate to the bin directory and enter the ./riskfortserver stop command.

Starting the Case Management Queuing Server

To start Case Management Server:

1. If the required environment variables have not been set, run the following command:
   `source <install_location>/arcot/sbin/arrfenv`

   In this command, replace *<install_location>* with the path of the directory in which RiskMinder has been installed.
2. Navigate to the following directory:
   install_location`/arcot/`**`bin`**`/`
3. Run the ./casemanagementserver start command.

Note: If you want to stop Case Management Server, then navigate to the bin directory and enter the ./casemanagementserver stop command.

Deploying User Data Service (UDS)

RiskMinder can access user data either from a relational database (RDBMS) or directly from an LDAP server by using UDS. UDS is an abstraction layer that provides RiskMinder seamless access to the third-party data repositories deployed by your organization.

You need the arcotuds.war file to deploy UDS, as follows:

1. Change the working directory to:
   install_location/arcot/sbin/
2. Type source arrfenv and press Enter to set the required environment variables.
3. Deploy arcotuds.war on the application server. This file is available at:
   install_location/arcot/java/webapps/

   For example, in the case of Apache Tomcat, deploy the WAR file at *APP_SERVER_HOME*/webapps/.

   Note: The deployment procedure depends on the application server that you are using. See the application server vendor documentation for detailed instructions.
4. (**For WebSphere Only**) Configure to reload the UDS class when the application files are updated.
   a. Navigate to Application, Enterprise Applications and access the UDS settings page.
   b. Under Class loader order, select the Classes loaded with local class loader first (parent last) option.
   c. Under WAR class loader policy, select Single class loader for application.
   d. Click Apply.
5. **(For JBoss Only)** Perform the following steps if you have deployed UDS on a JBoss application server:
   a. Copy the Bouncy Castle JAR file (bcprov-jdk15-146.jar) from *install_location*/arcot/java/lib/ to the following location:
   JBOSS_HOME/common/lib/
   b. Navigate to the following location:
   JBOSS_HOME/server/default/conf/
   c. Open jboss-log4j.xml file in a text editor.
   d. Add the following log configuration in the <log4j:configuration> section:

```
<appender name="arcotudslog" class="org.apache.log4j.RollingFileAppender">
<errorHandler
class="org.jboss.logging.util.OnlyOnceErrorHandler"></errorHandler>
<param name="Threshold" value="INFO"/>
<param name="MaxFileSize" value="10MB"/>
<param name="MaxBackupIndex" value="100"/>
<param name="Encoding" value="UTF-8"/>
<param name="Append" value="true"/>
```

```
<param name="File" value="${arcot.home}/logs/arcotuds.log"/>
<layout class="org.apache.log4j.PatternLayout">
<param name="ConversionPattern" value="%d{yyyy-MM-dd hh:mm:ss,SSS z} : [%t]
: %-5p : %-5c{3}(%L) : %m%n"/>
</layout>
<filter class="org.jboss.logging.filter.TCLMCFilter">
<param name="AcceptOnMatch" value="true"/>
<param name="DeployURL" value="arcotuds.war"/>
</filter>
<!-- end the filter chain here -->
<filter class="org.apache.log4j.varia.DenyAllFilter"></filter>
</appender>
```

e. Add the following line in the com.arcot category that you created while Deploying Administration Console:
`<appender-ref ref="arcotudslog"></appender-ref>`

Add the following line in the cryptographic category that you created while Deploying Administration Console:

```
<appender-ref ref="arcotudslog"></appender-ref>
```

a. Save and close the file.

1. Restart the application server.
2. Verify if UDS was deployed successfully:

   Note: The arcotuds.log file is used for logging UDS-related information.

   a. Navigate to the following location:
   install_location/arcot/**logs**/

   b. Open the arcotuds.log file in any editor and locate the following line:

      - User Data Service (Version: 2.0.3) initialized successfully.

      This line indicates that UDS was deployed successfully.

   c. Also ensure that the log files *do not* contain any FATAL *and* WARNING messages.

   d. Close the file.

Verifying the Installation

To verify that the server started correctly:

1. Navigate to the following location:
   install_location/arcot/logs/
2. Open the arcotriskfortstartup.log file in any editor and locate the following lines:
   - **For Solaris:** STARTING Arcot RiskFort 3.1.01_s
   - **For RHEL:** STARTING Arcot RiskFort 3.1.01_l
   - Arcot RiskFort Service READY
3. Open the arcotriskfortcasemgmtserverstartup.log file in any editor and locate the following lines:
   - **For Solaris:** STARTING Arcot RiskFort Case Management 3.1.01_s
   - **For RHEL:** STARTING Arcot RiskFort Case Management 3.1.01_l
   - Arcot RiskFort Case Management Service READY

Note: Also ensure that the log files do not contain any FATAL and WARNING messages.

Installing on the Second System

After you install RiskMinder Server and Administration Console, install the other components on the second system in this distributed environment. The specific components to install must have been determined when you followed the instructions in Planning the Deployment (see page 31).

Note: Before you proceed, ensure that all prerequisite software components are installed on this system as described in Preparing for Installation (see page 45).

To install RiskMinder components on the second system:

1. Copy the installer file on the target (second) system:
   - **For Solaris:**
     `Arcot-RiskFort-3.1.01-Solaris-Installer.bin`
   - **For Linux:**
     `Arcot-RiskFort-3.1.01-Linux-Installer.bin`
2. Ensure that you have the permissions required to run the installer. If not, run the following command:
   - **For Solaris:**
     `chmod a=rx Arcot-RiskFort-3.1.01-Solaris-Installer.bin`
   - **For Linux:**
     `chmod a=rx Arcot-RiskFort-3.1.01-Linux-Installer.bin`
3. Run the installer as follows:
   - **For Solaris:**
     `prompt> sh Arcot-RiskFort-3.1.01-Solaris-Installer.bin`
   - **For Linux:**
     `prompt> sh Arcot-RiskFort-3.1.01-Linux-Installer.bin`
4. Follow the installer instructions from Step 6 in Installing on the First System (see page 106) until you reach the Choose Install Set screen.
5. Select the components that you want to install.

   Typically, you install the Java SDKs for Risk Evaluation and Sample Application.
6. After you have selected all the components, follow Step 11 through Step 18 in Installing on the First System (see page 106) to complete the installation.

Performing Post-Installation Tasks on the Second System

Perform the following post-installation tasks on the second system, where you have installed Java SDKs and Web services:

1. Deploying Sample Application (see page 136)
2. Configuring Sample Application for Communication with RiskMinder Server (see page 137)
3. Using Sample Application (see page 138)

Note: After you complete these configurations, configure RiskMinder SDKs (and Web services), as discussed in Configuring RiskMinder SDKs and Web Services (see page 143).

Deploying Sample Application on the Second System

Important! Sample Application must *not* be used in production deployments. It is recommended that you build your own web application by using Sample Application as a code reference.

Sample Application can be used to verify if RiskMinder was installed and configured properly. In addition, it demonstrates:

- The typical RiskMinder workflows
- The basic operations (invocation and post-processing) of RiskMinder APIs
- Integration of your application with RiskMinder

Note: If you did not install Sample Application during the installation, then you can install *only* Sample Application by running the installer again and by selecting the **SDKs and Sample Application** options and proceed with the installation process.

To deploy Sample Application on your application server:

1. Deploy the riskfort-3.1.01-sample-application.war file from the following location: *install_location*/arcot/**samples**/**java**/
2. If necessary, restart the application server.
3. Access Sample Application in a Web browser window. The default URL for Sample Application is:

   http://host_name:appserver_port/riskfort-3.1.01-sample-application/index.jsp

Configuring Sample Application for Communication with RiskMinder Server

The riskfort.risk-evaluation.properties file provides the parameters for the Java SDK and Sample Application to read RiskMinder Server information. Therefore, after deploying Sample Application, configure it to communicate with RiskMinder Server. This file is only available *after* you deploy the Sample Application WAR file, riskfort-3.1.01-sample-application.war.

To configure the riskfort.risk-evaluation.properties file:

1. Navigate to the riskfort.risk-evaluation.properties file on your application server.

   On Apache Tomcat, this file is available at: `<App_Home/riskfort-3.1.01-sample-application>/WEB-INF/classes/properties/`

   Here, <*App_Home*/riskfort-3.1.01-sample-application/> represents the directory path where RiskMinder application WAR files are deployed.

2. Open the riskfort.risk-evaluation.properties file in an editor window and set the value for the following parameters:

   - HOST.1
   - PORT.1

     A default value is specified for the remaining parameters in the file. You can change these values, if required. For more information about configuration parameters, see riskfort.risk-evaluation.properties (see page 218).

3. (**Optional:** Perform this step only if you configured SSL-based communication in chapter, "Configuring SSL")

   Set the following parameters:

   - TRANSPORT_TYPE=SSL (By default, this parameter is set to TCP.)
   - CA_CERT_FILE=<*absolute_path_of_Root_Certificate_in_PEM_FORMAT*>

     For example, you can specify one of the following values:

     - CA_CERT_FILE=<*install_location*>/certs/<ca_cert>.pem
     - CA_CERT_FILE=<install_location>\\certs\\<ca_cert>.pem

4. Save the changes and close the file.
5. Restart the application server to reflect these changes.

Using Sample Application

Each operation in Sample Application is designed to run without error when RiskMinder is installed and functional. The following sections describe the risk-evaluation operations that can be performed by using Sample Application:

- Performing Risk Evaluation and Post Evaluation for a First-Time User (see page 138)
- Creating Users (see page 139)
- Performing Risk Evaluation and Post Evaluation for a Known User (see page 140)
- Editing the Default Profile and Performing Risk Evaluation (see page 141)

Performing Risk Evaluation and Post Evaluation for a First-Time User

To perform risk evaluation on the default profile of a user:

1. Ensure that Sample Application is open (in a Web browser window.) The default URL for Sample Application is:

   http://<host>:<appserver_port>/riskfort-3.1.01-sample-application/index.jsp

2. Click Evaluate Risk to open the Risk Evaluation page.
3. On the page, specify the name of the user (who you want to evaluate) in the User Name field.
4. Specify the name of the organization to which the user belongs in the User Organization field.
5. (Optional) Specify the channel from which the transaction originated.
6. Click Evaluate Risk to open the Risk Evaluation Results page.

   This page displays the Risk Score, the associated Risk Advice, and lists the rules that are configured for the specified organization. For a first-time user, the result is ALERT.

7. Click Next Step to open the Post Evaluation page and perform post-evaluation on the specified user profile.

   By using post-evaluation, your application provides feedback to RiskMinder Server about the current user and the device that they are using. Based on this feedback, RiskMinder updates user and device attributes and the user-device association. It then assesses the risk that is associated with future transactions performed by the user.

8. Select the result of secondary authentication by selecting the appropriate option from the Result of Secondary Authentication list.
9. Specify the name for the user name-device association in the Association Name field.
10. Click Post Evaluate to complete the post evaluation process and to display the result of the same in the Post Evaluation Results section.

Creating Users

To create a user:

1. Create a GA account:
    a. Log in to Administration Console as the MA.
    b. Ensure that the **Users and Administrators** tab is active.
    c. On the left pane, click the **Create Administrator** link to display the Create Administrator page.
    d. Specify the details on the page and click **Next**.
    e. On the Create Administrator page, select **Global Administrator** from the **Role** list.
    f. Specify the **Password** and **Confirm Password**.
    g. Select the **All Organizations** option in the **Manages** section.
    h. Click **Create**.
    i. Click **Logout** in the top right-hand corner of the page to log out as the MA.
2. Log in to Administration Console as a Global Administrator (GA) or an Organization Administrator (OA). The URL for the purpose is:

    http://<host>:<appserver_port>/arcotadmin/adminlogin.htm
3. Follow the instructions that are displayed to change your password.
4. If already not activated, activate the **Manage Users and Administrators** sub-tab under the **Users and Administrators** tab.
5. In the left pane, under **Manage Users and Administrators**, click **Create User** to open the Create User page.
6. On the Create User page:
    a. Enter a unique user name, their organization name, and optionally, other user information in the **User Details** section
    b. (Optional) Specify other user information in the corresponding fields on the page.
    c. Select the required **User Status**.
    d. Click **Create User.**

    The "Successfully created the user." message appears if the specified user was successfully added to the database.
7. Return to the RiskFort Sample Application page.

Performing Risk Evaluation and Post Evaluation for a Known User

To perform risk evaluation and post-evaluation for a known user:

1. On the Main Page of Sample Application, click **Evaluate Risk** to open the Risk Evaluation page.
2. In the **User Name** field, specify the name of the user that you created in the section, "Creating Users" (see page 139).
3. Specify the user's organization in the **User Organization** field.
4. (Optional) Specify the **Channel** from which the transaction originated.
5. Click **Evaluate Risk** to open the Risk Evaluation Results page.

   The Risk Advice typically is **INCREASEAUTH**.
6. Click **Store DeviceID** to store the specified type of Device ID information about the end user's device.
7. Click **Next Step** to perform Post Evaluation:
   - Select the **Result of Secondary Authentication** from the list.
   - (Optional) Edit the **Association Name**.
8. Click **Post Evaluate** to display the final advice.

   If you repeat Step 1 through Step 5, the **Risk Advice** will change to **ALLOW** on the Risk Evaluation Results page.

Editing the Default Profile and Performing Risk Evaluation

Using Sample Application, you can change the DeviceDNA, IP address, and the Device ID of the computer that you are using to simulate various scenarios. To edit the default profile of a user:

1. On the Main Page of Sample Application, click **Evaluate Risk** to open the Risk Evaluation page.
2. Specify the user name whose profile you want to edit in the **User Name** field.
3. Specify the user's organization in the **User Organization** field.
4. (Optional) Specify the **Channel** from which the transaction originated.
5. Click **Edit Inputs** to open the Edit Risk-Evaluation Inputs page.
6. On the page, all fields are pre-populated. Change the values for one or more of the required fields:
   - My User Name
   - My Org
   - My Channel
   - Machine Finger Print of My Device
   - Short Form of Machine Finger Print of My Device
   - IP Address of My Machine
   - Device ID of My Machine
7. Click **Evaluate Risk** to open the Risk Evaluation Results page.
8. Click **Next Step** to open the Post Evaluation page and perform post-evaluation on the specified user profile.
9. Select the result of secondary authentication by selecting the appropriate option from the **Result of Secondary Authentication** list.
10. Click **Post Evaluate** to complete post-evaluation and display the result of the same.

Note: To ensure secure communication between RiskMinder components, you can configure them to support SSL transport mode. *See chapter, "Configuring SSL"* for more information.

Applying the Post-Installation Checklist

Use the following checklist to note down installation and setup information for RiskMinder. This information is useful when performing various administrative tasks later.

Your Information	Example Entry	Your Entry
ARCOT_HOME	/var/opt/arcot/	
SYSTEM INFORMATION		
Host Name	my-bank	
User Name	administrator	
Password	password1234!	
Configured Components	RiskFort Server Administration Console User Data Service	
ADMINISTRATION CONSOLE INFORMATION		
Host Name	localhost	
Port	8080	
Master Administrator Password	mypassword1234!	
USER DATA SERVICE INFORMATION		
Host Name	localhost	
Port	8080	
Application Context Root	arcotuds	

Chapter 6: Configuring RiskMinder SDKs and Web Services

This section describes the steps to configure the Application Programming Interfaces (APIs) and Web services that are provided by RiskMinder.

The section covers the following topics:

RiskMinder APIs

RiskMinder is shipped with a set of Java APIs that are copied to <*install_location*>/arcot/sdk/java/lib/arcot/ during the installation. In this location, the core JAR is the Risk Evaluation SDK, arcot-riskfort-evaluaterisk.jar. In addition, the following JARs that this core JAR is dependent on are also available:

- arcot_core.jar
- arcot-pool.jar
- arcot-riskfort-mfp.jar

Important! At this location, you also see the JAR for Issuance SDK, arcot-riskfort-issuance.jar. However, this API has been deprecated in this release and only has been included for backward compatibility. Instead of this API, use the User Management Web Service. See the *CA RiskMinder Web Services Developer's Guide* for detailed information.

The arcot-riskfort-evaluaterisk.jar file comprises the com.arcot.riskfort API package, which provides the logic for risk assessment. Operations that this package enables include:

- Evaluate and assess risk
- Generate advice
- List user-device associations
- Delete associations

Configuring Java APIs

This section provides the procedure to configure the Java APIs so that they can be used with your application.

Important! Before proceeding with the configuration steps in this section, ensure that the JARs required for implementing the Java APIs are installed at <*install_location*>/arcot/sdk/java/lib/.

To configure RiskMinder Risk Evaluation APIs for using with a J2EE application:

Note: The following instructions are based on Apache Tomcat Server. The configuration process may vary depending on the application server you are using. See the application server documentation for detailed information about these instructions.

1. Copy the following JAR files from <*install_location*>/arcot/ to the appropriate location in your <APP_SERVER_HOME> directory. For example, on Apache Tomcat this location is <Application_Home>/WEB-INF/lib/.
   - /sdk/java/lib/arcot/arcot_core.jar
   - /sdk/java/lib/arcot/arcot-pool.jar
   - /sdk/java/lib/arcot/arcot-riskfort-evaluaterisk.jar
   - /sdk/java/lib/arcot/arcot-riskfort-mfp.jar
   - /sdk/java/lib/external/bcprov-jdk15-146.jar
   - /sdk/java/lib/external/commons-lang-2.0.jar
   - /sdk/java/lib/external/commons-pool-1.5.5.jar
2. Configure the log4j.properties.risk-evaluation and riskfort.risk-evaluation.properties files as follows:
   - If the application *already has* a configured log4j.properties.risk-evaluation file, then merge it with the following log configuration files:
     `<install_location>/arcot/sdk/java/properties/log4j.properties.risk-evaluation`
     `<install_location>/arcot/sdk/java/properties/riskfort.risk-evaluation.properties`
   - If the application *does not have* the log4j.properties file already configured, then:
     a. Rename log4j.properties.risk-evaluation to log4j.properties.
     b. Merge riskfort.risk-evaluation.properties with log4j.properties.
     c. Copy the log4j.properties file to:

        <*Application_Home*>/WEB-INF/classes/properties/

Note: To know more about APIs and their initialization, see the RiskMinder Javadocs at <*install_location*>/arcot/docs/riskfort/Arcot-RiskFort-3.1-risk-evaluation-sdk-javadocs.zip.

Working with RiskMinder Web Services

Important! To use the RiskMinder Web services, deploy the **arcotuds.war** file. For information about the procedure, see Deploying User Data Service (UDS) (see page 93).

RiskMinder provides Web services for managing users, organizations, administration, and for performing risk assessments. The WSDLs for these Web services are available at <*install_location*>/arcot/wsdls/.

Generating Client Code Using the WSDLs

Important! Before you proceed with the client code generation, ensure that the RiskMinder package was installed successfully and that the Server is up and running.

After the installation, generate the client stub in the language you want to code in by using the WSDLs that are shipped with RiskMinder. These WSDLs enable the Web services client to communicate with RiskMinder Server.

To generate the client code:

1. Stop the application server.
2. Navigate to the following location:
   `<install_location>/arcot/wsdls/<required_folder>`
3. Use the required WSDL file (listed in the following table) to generate the client code.

WSDL File	Description
admin/**ArcotRiskFortAdminWebService.wsdl**	Used for creating and managing rule configurations that are typically done by using Administration Console.
riskfort/**ArcotRiskFortEvaluateRiskService.wsdl**	Used for performing risk evaluation.
uds/**ArcotUserRegistryMgmtSvc.wsdl**	Used for creating and managing organizations in your setup.
uds/**ArcotConfigRegistrySvc.wsdl**	Used for creating and managing user account types.

WSDL File	Description
uds/**ArcotUserRegistrySvc.wsdl**	Used for creating and managing users and user accounts.

4. Restart the application server.
5. In a browser window, access the end-point URLs (listed in the following table) to verify if the client can access the Web Service.

Web Service	URL
ArcotRiskFortAdminWebService	*http://<rf_hostname>:<rf_port>/services/ArcotRiskFortAdminSvc* The default *port* here is **7777**.
ArcotRiskFortEvaluateRiskService	*http://<rf_hostname>:<rf_port>/services/RiskFortEvaluateRiskSvc* The default *port* here is **7778**.
ArcotUserRegistryMgmtSvc	*http://<app_server_hostname>:*<appserver_port>*/arcotuds/services/ArcotUserRegistrySvc* The *port* that you must specify here is your application server port.
ArcotConfigRegistrySvc	http://<*app_server_hostname*>:<appserver_port>/arcotuds/services/ArcotConfigRegistrySvc The *port* that you must specify here is your application server port.
ArcotUserRegistrySvc	*http://<app_server_hostname>:*<appserver_port>*/arcotuds/services/ArcotUserRegistryMgmtSvc* The *port* that you must specify here is your application server port.

Note: For more information about generating the Java client, see the *CA RiskMinder Web Services Developer's Guide*.

Configuring Device ID and DeviceDNA

RiskMinder uses Device ID and DeviceDNA to register and identify the device that is used by a user during transactions. The Device ID is stored on the end user's device. The Device ID information is in encrypted format.

The following are the options for storing the Device ID on the end user's device. The plugin store is the most persistent storage option.

- Plugin store: The plugin store is a permanent store on the end user's device. A Device ID that is placed in the plugin store cannot be deleted by common end-user actions, such as clearing browser cache and deleting browser cookies. The plugin store is supported from CA RiskMinder Client release 2.1 onward.
- Local storage that is provided in HTML5
- UserData store: This store is available only in Microsoft Internet Explorer
- Cookie store: Typically, on Microsoft Windows, the Device ID is stored in one of the following folders:
  - **Internet Explorer on Microsoft Windows 7 or 2008:**
    `C:\Documents and Settings\<user_profile>\Application Data\Microsoft\Windows\Cookies\`
  - **Internet Explorer on Microsoft Windows 2003 or XP:**
    `C:\Documents and Settings\<user_profile>\Cookies\`
  - **Mozilla Firefox:**
    `C:\Documents and Settings\<user_profile>\Application Data\Mozilla\Firefox\Profiles\<random_dirname>\cookies.sqlite`
  - **Safari:**
    `C:\Documents and Settings\<user_name>\Application Data\Apple Computer\Safari\cookies.plist`

Important! From CA RiskMinder Client release 2.0 onward, the Device ID is not stored as a Flash cookie. If you have existing Flash cookies from an earlier release, then these cookies are automatically migrated to one of the stores that are listed earlier in this section.

File You Will Need for Device ID and DeviceDNA Collection

When you perform Complete installation (Performing Complete Installation (see page 68)) or select RiskMinder Evaluation SDK or Web Service on the Choose Install Set screen, the following file is automatically installed:
<install_location>/arcot/sdk/**devicedna/riskminder-client.js**

This file provides the functions to get and set the Device ID and DeviceDNA.

- Enabling Device ID and DeviceDNA Collection (see page 148)
- Migrating Flash Cookies from Preceding Releases (see page 148)

Enabling Device ID and DeviceDNA Collection

To configure an HTTP cookie to be set on the end user's computer, include **riskminder-client.js** in the application pages that get or set the HTTP cookies:

1. Copy the entire devicedna directory from *<install_location>*/arcot/sdk to the appropriate web application directory. Typically, the web application folder is at the following location:
   <APP_SERVER_HOME>/<Your_Application_Home>
2. Include the **riskminder-client.js** file in the required application pages. Ensure that these files are located in a folder that is relative to the folder containing **index.jsp**.
   ```
   <script type="text/javascript"
   src="devicedna/riskminder-client.js"></script>
   ```

Migrating Flash Cookies from Preceding Releases

As mentioned earlier, Flash cookies are not supported any more for storing the Device ID. However, if you have existing Flash cookies from an earlier release, then these cookies are automatically migrated to one of the supported stores on the end user's device when you complete the tasks described in "Collecting Device ID and DeviceDNA" in one of the following guides:

- CA RiskMinder Java Developer's Guide
- CA RiskMinder Web Services Developer's Guide

Enabling SSL Communication

RiskMinder supports SSL communication between RiskMinder Server and its Java SDKs. Based on the application server that you are using, see chapter, "Configuring SSL" for detailed information about setting SSL as the transport mode between RiskMinder Server and its clients.

Chapter 7: Upgrading RiskMinder

This section describes the steps to upgrade your existing release of RiskMinder to release 3.1.01. It includes the following topics:

Upgrade Overview

You can upgrade to RiskMinder 3.1.01 from any of the following releases:

- 1.5.1, 1.5.1.*x*, 1.6, 1.6.0.*x*, 1.7, or 1.7.0.*x* (collectively referred to as 1.*x* in this document)
- 2.0, 2.2, 2.2.5.3 through 2.2.5.11, 2.2.6, 2.2.7, 2.2.8, or 2.2.9 (collectively referred to as 2.*x* in this document)
- 3.0, 3.0.1, or 3.1 (collectively referred to as 3.*x* in this document)

Important! If you have a release of RiskMinder that is not listed here, apply the required patches to upgrade to one of these releases, and then proceed with the upgrade. See the corresponding *Release Notes* for the patch upgrade instructions.

If you are upgrading from release 1.*x*, first upgrade to release 2.2.7 and then upgrade to release 3.1.01. However, if you are upgrading from release 2.*x* or 3.x, then directly upgrade to release 3.1.01.

Database Privileges Required for Upgrade

The following table lists the database privileges that you must have for performing the database procedures that are related to upgrading to RiskMinder 3.1.01:

Database Type	Upgrade Privileges	Run time Privileges
Oracle	CREATE TABLE	CREATE TABLE
	CREATE ANY INDEX	DML Privileges
	CREATE ANY SEQUENCE	
	CREATE TABLESPACE (*for Reports*)	
	ALTER TABLESPACE	
	CREATE PROCEDURE	

Database Type	Upgrade Privileges	Run time Privileges
	UNLIMITED TABLESPACE (*for Reports, optional*)	
	DROP TABLESPACE	
	ALTER ANY TABLE	
	DML Privileges (including CREATE SESSION privilege)	
MS SQL Server **Note:** UserID must also have the database role of ddladmin. If the database user is dbowner, then the database user already has ddladmin privileges.	CREATE TABLE	CREATE TABLE
	CREATE INDEX	DML Privileges
	CREATE PROCEDURE	
	EXECUTE PROCEDURE	
	REFERENCES	
	ALTER TABLE	
	DML Privileges	

Upgrading to Release 3.1.01

Upgrading from 1.x to 3.1.01 is a two-stage procedure. You first upgrade from 1.x to 2.2.7 and then upgrade from 2.2.7 to 3.1.01. In contrast, if you are upgrading from 2.x or 3.x, you directly upgrade to 3.1.01.

Perform the following steps to upgrade to RiskMinder 3.1.01:

1. Performing Pre-Upgrade Tasks (see page 152)
2. If you are upgrading from 1.x, then perform the steps described in Migrating the Database to Release 2.2.7 for Arcot Common Components (see page 157). Do not perform this step if you are upgrading from 2.x or 3.x.
3. If you are upgrading from 1.x, then perform the steps described in Migrating the Database to Release 2.2.7 for RiskMinder Components (see page 158). Do not perform this step if you are upgrading from 2.x or 3.x.
4. Preparing for the Upgrade to 3.1.01 (see page 159)
5. Migrating the Database to Release 3.1.01 for Arcot Common Components (see page 160)
6. Migrating the Database to Release 3.1.01 for RiskMinder Components (see page 163)
7. Uninstalling the Existing Release of RiskMinder (see page 164)
8. Reinstalling RiskMinder (see page 165)
9. If you encounter any warnings during the Server startup and if your transactions fail, then perform the steps described in (In Error Scenario Only) Reverting to Your Initial Setup (see page 168).
10. Performing Post-Upgrade Tasks (see page 169)
11. Replacing Deprecated Rules with New Rules (see page 172)
12. Reviewing Configuration Changes After Upgrade (see page 176)

Performing Pre-Upgrade Tasks

Important! Perform the upgrade procedure on the system where the Administration Console is installed.

Perform the following pre-upgrade tasks before you begin the upgrade procedure:

- If you are upgrading from RiskFort 1.*x* to 3.1.01, migrate all your proposed configuration data to production, if required. Only active data is migrated and available after upgrade.

  Note: If you are upgrading from RiskFort 2.*x* or 3.x to 3.1.01, both proposed and active configuration data get migrated.

- From release 3.1.01 onward, a rule with a score of 0 no longer carries the ALLOW advice. Instead, a score of 0 implies SILENT, which means that the rule is executed but is not used for scoring. In addition, if the default score was 0 before the upgrade, then the default rule score is changed to 1 during the upgrade.

  Note: For information about changing the score of a rule, see the administration guide for your RiskMinder release.

- Custom add-on rule types that you created in release 2.x or earlier releases are not migrated during the upgrade. The feature to create a custom add-on rule type by importing an XML file has been deprecated. If your RiskMinder deployment contains custom add-on rule types, then it is recommended that you delete them before the upgrade.

- If the mnemonic of an existing rule is the same as the mnemonic of a rule that is newly introduced or modified by the upgrade, then the upgrade fails. The same issue is encountered if the name of an existing rule is the same as the name of a new rule. To avoid this issue:

  1. Use the administration console to compare the mnemonics of your existing rules with the mnemonics of the rules that are newly introduced or modified by the upgrade.

     The following table lists the rules that are newly introduced or modified by the upgrade:

Rule Name	Rule Mnemonic
Unknown DeviceID	UNKNOWNDEVICEID
Device MFP Not Match	MFPMISMATCH
User Not Associated with DeviceID	USERDEVICENOTASSOCIATED
Unknown User	UNKNOWNUSER

2. If the mnemonic of an existing rule matches the mnemonic of a new rule, delete the existing rule and then re-create it. While you are re-creating the rule, give it a different mnemonic. The system allows the rule name to be the same for two different rules, but it is recommended that you change the name of the existing rule to avoid confusion.

   Note: For information about deleting and creating rules, see the administration guide for your current RiskMinder release.

- In release 2.x, you can have a rule, ruleset, or miscellaneous rule configuration refer to another rule, ruleset, or miscellaneous rule configuration. This feature is not available from release 3.1.01 onward. Perform the following steps for each rule, ruleset, or miscellaneous rule configuration that refers to another rule, ruleset, or miscellaneous rule configuration:

  a. Log in to the Administration Console as a GA or OA.

  b. If you have logged in as the GA and you want to perform this procedure for a system ruleset, click the Services and Server Configurations tab.

  c. If you have logged in as the GA or OA to perform this procedure for a single organization:

     Activate the Organizations tab.

     Click the Search Organization link under Manage Organizations.

     Click the Search button on the Search Organization page to display the list of organizations.

     Click the name of the organization.

     Click the RiskFort Configuration tab.

  d. Under the Rules Management section on the side-bar menu, click the link for the rule, ruleset, or miscellaneous rule configuration that refers to another rule, ruleset, or miscellaneous rule configuration.

  e. Select Use Own.

  f. Select Copy from an Existing Ruleset.

  g. From the Ruleset Name list, select the ruleset to which this rule, ruleset, or miscellaneous rule configuration was referring.

  h. Click Save.

  i. Migrate the changes to production.

     Note: For detailed information about migrating the changes to production and refreshing the cache, see the *CA RiskMinder Administration Guide*.

- The upgrade process is supported only in the offline mode. Shut down the following gracefully:
  - RiskFort Server
  - Case Management Queuing Server
  - Any application servers where Administration Console and User Data Service are deployed

- If Administration Console is open, close it.
- Open the $ARCOT_HOME/conf/arcotcommon.ini file in a text editor, and then perform the following steps:
  a. Ensure that the primary database details are correct. The upgrade tool uses the database that is configured in this file for the upgrade.
  b. If you have configured a backup database, then you must disable the backup database by commenting out the lines containing the following properties in the arcot/db/backupdb section of the arcotcommon.ini file:
     - URL.1
     - AppServerConnectionPoolName.1
     - Username.1
  c. Include the following section in the arcotcommon.ini file:
     ```
     [arcot/crypto/device]
     HSMDevice=S/W
     ```
  d. Save and close the arcotcommon.ini file.
- Ensure that you have JDK 1.5 or later installed on the system where you plan to upgrade.
- Ensure that the database on which you plan to upgrade is available throughout the upgrade process.
- Ensure that the database on which you plan to upgrade is disabled for replication.
- Back up the database containing the RiskMinder schema.
- If you require multi-byte character or internationalization support in RiskMinder and if your database does not currently support multi-byte data, then migrate the database to a character set that supports multibyte data. For more information, see Configuring Database Server (see page 54).
- Consider the requirements, such as rollback segment size, which are based on data volume, before running the upgrade tool.
- Ensure that you have the database privileges that are required to upgrade RiskMinder. For the complete list of privileges, see Database Privileges Required for Upgrade (see page 149).
- If you have stored user details in an LDAP repository in the previous release, ensure that the LDAP server is available throughout the upgrade process.
- Ensure that the ARCOT_HOME environment variable is set to the directory where RiskFort is installed.
- Copy the contents of your existing ARCOT_HOME directory to a new directory.

  Here, ARCOT_HOME refers to the base directory that contains the entire directory structure that was created by the existing RiskMinder installation. Typically, ARCOT_HOME is *install_location*/arcot/.

ARCOT_HOME_BACKUP refers to the backup directory into which you copy the contents of the existing the ARCOT_HOME directory. If you encounter any errors during upgrade, use the ARCOT_HOME_BACKUP directory to revert to the initial setup.

Migrating the Database to Release 2.2.7 for Arcot Common Components

Note: Perform this procedure only if you are upgrading from release 1.x. If you are upgrading from release 2.x or 3.x, you can ignore this procedure.

Important! If you installed AuthMinder with RiskMinder and completed the AuthMinder upgrade, then do *not* migrate the database for Arcot common components. This is because the database migration has already been performed during the AuthMinder upgrade.

Migrate the database to the release 2.2.7 state for Arcot common components.

Follow these steps:

1. Copy the Upgrade directory to a temporary location on the system where you plan to upgrade.

   This directory contains the following zip files that are applicable for this migration path:

   - arcot-common-upgrade-0.*x*-1.0.zip
   - arcot-riskfort-upgrade-1.*x*-2.2.7.zip

2. Copy the arcot-common-upgrade-0.*x*-1.0.zip file to the ARCOT_HOME directory.
3. Extract the contents of the arcot-common-upgrade-0.*x*-1.0.zip file in this directory.
4. Navigate to the following directory:
   `$ARCOT_HOME/dbscripts/<db_type>`

   Here, *db_type* can be mssql or oracle.

5. Run the arcot-db-config-for-common-1.0.sql script.

   Note: In SQL Server, if you run the database script from the command line using SQLCMD, then you must specify the –I option to set the QUOTED_IDENTIFIER connection option to ON and the -x option to disable variable substitution.

6. Navigate to the following directory:
   `$ARCOT_HOME/dbscripts/<db_type>/upgrade-scripts/`

   Here, *db_type* can be mssql or oracle.

7. Run the arcot-upgrade-for-common-1.0.sql script.

   Note: In SQL Server, if you run the database script from the command line using SQLCMD, then you must specify the –I option to set the QUOTED_IDENTIFIER connection option to ON and the -x option to disable variable substitution.

8. Download the JDBC JAR that is compatible with your database:

   - Oracle: ojdbc.jar
   - SQL Server: sqljdbc.jar

Copy it to the following directory:
`$ARCOT_HOME/java/lib`

9. Back up the existing libArcotAccessKeyProvider.so file if it is in the following directory. Then, copy the $ARCOT_HOME/native/<*platform*>/<*32bit-or-64bit*>/libArcotAccessKeyProvider.so file to <*JAVA_HOME used by Application Server*>/jre/bin.
10. Set and export the LD_LIBRARY_PATH variable to the directory where libArcotAccessKeyProvider.so is copied.
11. Copy the file $ARCOT_HOME/java/lib/arcot-crypto-util.jar

    to
    `<JAVA_HOME used by Application Server>/jre/lib/ext/`
12. Navigate to the $ARCOT_HOME/tools/upgrade directory.

    Note: Ensure that you have the privileges that are required to run the upgrade-common.sh tool.
13. Run the upgrade-common.sh tool.
14. To ensure that the common database upgrade operation was run successfully, examine the $ARCOT_HOME/logs/upgrade-common.log file.

Migrating the Database to Release 2.2.7 for RiskMinder Components

Important! Perform this procedure in this section only if you are upgrading from release 1.x. If you are upgrading from release 2.x or 3.x, you can ignore this procedure.

After you migrate the database for Arcot common components, migrate the database to the release 2.2.7 state for RiskMinder components.

Follow these steps:

1. Copy the arcot-riskfort-upgrade-1.*x*-2.2.7.zip file to the ARCOT_HOME directory.
2. Extract the contents of the arcot-riskfort-upgrade-1.*x*-2.2.7.zip file in this directory.
3. Navigate to the following directory:
   `$ARCOT_HOME/dbscripts/<db_type>/upgrade-scripts`

   Here, *db_type* can be mssql or oracle.
4. Run the SQL script corresponding to your current release of RiskMinder, as listed in the following table.

Current RiskFort Release	SQL Script to Run
1.5.1 or 1.5.1.*x*	arcot-riskfort-upgrade-1.5.1.8-2.2.7.sql
1.6 or 1.6.0.*x*	arcot-riskfort-upgrade-1.6.0.3-2.2.7.sql
1.7 or 1.7.0.*x*	arcot-riskfort-upgrade-1.7.0.3-2.2.7.sql

5. Navigate to the following directory:
   `$ARCOT_HOME/dbscripts/<db_type>/upgrade-scripts/`

   Here, *db_type* can be mssql or oracle.

6. Run the arcot-post-upgrade-for-common-1.0.sql script.

   This script results in the following changes:

   - The user ID for Master Administrator is changed from MASTER_ADMIN to MASTERADMIN.
   - The password for the MASTERADMIN account is **master1234!**
   - The organization that MASTERADMIN belongs to is MASTERADMIN. This configuration is useful when you filter reports.
   - The Administrators group is configured with WebFort User/Password authentication. Administrators belonging to this group must continue to use the same user name and password.
   - Group2 is the initial Default Organization.

Preparing for the Upgrade to 3.1.01

Perform these steps if application server connection pooling was being used or if SSL has been configured for the connection with the database.

Follow these steps:

1. If application server connection pooling was being used in your existing RiskMinder deployment, navigate to the $ARCOT_HOME/sbin directory and update the securestore.enc file by running the following command for the primary database:
   `DBUtil -pi <DB_username> <DB_password>`

   Note: To determine whether database connection pooling is being used, open the $ARCOT_HOME/conf/arcotcommon.ini file. Check the value of the AppServerConnectionPoolName parameter.

2. If SSL has been configured for the connection with the database, navigate to the $ARCOT_HOME/sbin directory and set the TrustStore password using DBUtil, as follows:
   `DBUtil -pi TrustStorePath.1 <truststore-password>`

   Note: To determine whether SSL has been configured, check the value of the TrustStorePath parameter in the arcotcommon.ini file.

Migrating the Database to Release 3.1.01 for Arcot Common Components

Migrate the database to the release 3.1.01 state for Arcot common components.

Important! If you installed AuthMinder with RiskMinder and completed the AuthMinder upgrade, then do not migrate the database for Arcot common components. This is because the database migration has already been performed during the AuthMinder upgrade.

Follow these steps:

1. Copy the Upgrade directory to a temporary location on the system where you plan to upgrade.

   This directory contains the following zip files that are applicable for this migration path:

   - arcot-common-upgrade-1.0.*x*-2.0.zip
   - arcot-riskfort-upgrade-2.x-3.x-3.1.01.zip

2. Copy the arcot-common-upgrade-1.0.*x*-2.0.zip file to the ARCOT_HOME directory.
3. Extract the contents of the arcot-common-upgrade-1.0.*x*-2.0.zip file in this directory.

   Note: Click **Yes** if you are prompted to overwrite any existing files.

4. Navigate to the following directory:
   `$ARCOT_HOME/tools/common/`**`upgrade`**
5. Extract the contents of the arcot-common-db-upgrade.zip file in this directory.
6. Download the JDBC JAR that is compatible with your database:

   - Oracle: ojdbc.jar
   - SQL Server: sqljdbc.jar

   Copy the JAR to the $ARCOT_HOME/tools/common/upgrade/**lib** directory.

7. Locate the JAVA_HOME used by the existing installation and ensure that you use the same JAVA_HOME to run the upgrade tool.
8. Set and export the LD_LIBRARY_PATH variable to the directory where libArcotAccessKeyProvider.so is present.

   Important! If you are upgrading from release 3.x to 3.1.01, do not perform the remaining steps of this procedure. Instead, directly proceed to the next section.

9. At the command prompt, change your working directory to:
   `$ARCOT_HOME/tools/common/upgrade/`
10. Run the arcot-common-upgrade-framework.jar file by using the following command:

```
java [JVM_Options] -jar arcot-common-upgrade-framework.jar
[--log-file <log-file-name>] [--log-level
<log-level>][--commit-batch-size <batch_size>] [--product-name
common] [--prompt][--mst]
```

The following table describes the options that are supported by this JAR file.

Option	Description
JVM-Options	The following JVM options are required only if LDAP organizations are configured: ■ -Xmx<*heap_memory_size_in_MB*>M: Sets the maximum heap size to 1 GB. If there are more than 1,00,000 users in the configured LDAP, then it is strongly recommended that you increase the heap size to 2048M (2 GB). -Dcom.arcot.ldap.migration.timeout=<*duration*>: The migration of an LDAP organization involves fetching all the users from the LDAP server and migrating the users to the RiskMinder database. This parameter sets the maximum time (in minutes) taken to fetch all users from the LDAP server, beyond which the migration of the LDAP organization is marked as failed. The LDAP migration timeout for 1,00,000 users is approximately 240 minutes or 4 hours. However, the timeout value would depend on the type of hardware configuration being used. The default value of this parameter is 240 minutes. **Note:** Ensure that the java command executable belongs to JAVA_HOME identified in Step 7. If JAVA_HOME is not set, modify the PATH environment variable to include $JAVA_HOME/bin.
log-file	Specifies the path to the log file: ■ If you do not provide any value, the arcot_common_upgrade.log file is created in the $ARCOT_HOME/logs/ directory. ■ If you provide an absolute path, the log file is created at the given location. ■ If you provide a file name, the log file is created in $ARCOT_HOME/logs/ with the given file name.
log-level	Specifies the log level. If you do not provide any value, the upgrade log level is set to INFO.

Option	Description
commit-batch-size	Specifies the number of transactions to be issued to the database before a COMMIT statement is issued.
product-name	Specifies the name of the product for which the upgrade is run. If you do not specify the product name, the product name is assumed to be common. Possible values are: ■ common: Indicates the Arcot common components. ■ riskfort: Indicates RiskMinder. **Note:** Ensure that you upgrade the Arcot common components before you upgrade RiskMinder.
prompt	Prompts whether to proceed further after each phase of the upgrade process is completed successfully. The upgrade process happens in the following phases: ■ Pre-upgrade: Involves performing various DDL and DML operations to migrate the database schema. ■ Upgrade: Involves migrating the data to the new schema. ■ Post-upgrade: Involves cleanup or follow-up actions that are required to be performed after the upgrade. ■ Verification: Involves the verifying of whether the upgrade is successful. This option You can choose to run the upgrade tool later to continue from where it stopped. If this option is not specified, the upgrade tool runs without any prompting until the upgrade process is completed.
mst	Refers to the Monitoring Sleep Time. If you specify this option, the upgrade tool prints diagnostic messages describing the progress made during upgrade after sleeping for the specified duration (in minutes.) The default value is two minutes.

1. If you are upgrading from release 1.0.x, then check for the following line in the $ARCOT_HOME/logs/arcot_common_upgrade.log file:

   Upgrade for common from version 1.0.x to version 2.0 run successfully.

   The presence of this line in the log confirms that the database was upgraded successfully.

Migrating the Database to Release 3.1.01 for RiskMinder Components

After you migrate the database for Arcot common components, migrate the database to the release 3.1.01 state for RiskMinder components.

Follow these steps:

1. Extract the contents of the arcot-riskfort-upgrade-2.x-3.x-3.1.01.zip file in the ARCOT_HOME directory.
2. Navigate to the following directory:
   `$ARCOT_HOME/tools/common/upgrade`
3. Run the following command:
   `java -jar arcot-common-upgrade-framework.jar --product-name riskfort`

   See the table in Migrating the Database to Release 3.1.01 for Arcot Common Components (see page 160) for a description of the command options.
4. Depending on the release that you are upgrading from, locate one of the following lines in the arcot_common_upgrade.log file in the $ARCOT_HOME/logs directory:
   `Upgrade for riskfort from version <your-RiskMinder-release> to version 3.1.01 run successfully.`

   For example, if you upgraded from release 3.0, then locate the following line:
   `Upgrade for riskfort from version 3.0 to version 3.1.01 run successfully.`

   The presence of this line in the log confirms that the database was upgraded successfully.

Uninstalling the Existing Release of RiskMinder

Uninstall the existing release of RiskMinder. Also uninstall the RiskMinder components that are installed on the application server.

Note: If the following instructions do not match the uninstallation options in your existing RiskMinder installation, follow the uninstallation instructions in the installation guide for your existing release of RiskMinder.

Follow these steps:

1. Uninstall the existing release of RiskMinder as follows:
   a. Ensure that the following components have been shut down gracefully:
      - RiskFort Server
      - Case Management Queuing Server
      - Any application servers where other RiskFort components are deployed.
   b. Ensure that the Administration Console is not open.
   c. Ensure that all INI and other files that are related to the RiskMinder configuration are closed.
   d. Change to the arcot/ directory.
   e. To start the uninstallation process, use the following command:
      ```
      sh <install_directory>/arcot/"Uninstall_Arcot RiskFort"/Uninstall Arcot RiskFort
      ```
      The Uninstall Arcot RiskFort screen appears.
   f. Enter 1 in the wizard window to specify that you want all features and components to be removed.
   g. Press Enter to confirm and continue with the uninstallation process.
   h. Press Enter to exit the wizard and complete the uninstallation process.
   i. If you have installed CA AuthMinder and CA RiskMinder and you are deleting both products, delete any files that are left over in the ARCOT_HOME directory.
2. Undeploy the Administration Console, User Data Service, and Sample Application Web applications from the application server. For detailed information, see the application server documentation.

Reinstalling RiskMinder

Depending on whether you earlier deployed RiskMinder on a single system or on a distributed system, perform the tasks that are described in one of the following sections:

- Reinstalling RiskMinder on a Single System
- Reinstalling RiskMinder on a Distributed System

Reinstalling RiskMinder on a Single System

Perform the tasks described in the following sections to reinstall RiskMinder on a single system:

Important! Use the database that you had migrated earlier during the upgrade operation.

Important! The information in these sections applies to both a fresh installation of RiskMinder and an upgrade of an existing RiskMinder installation. Some of the steps that are mentioned in these sections do not apply in an upgrade scenario. For example, MySQL-related steps are applicable only for an upgrade from release 3.1 because MySQL is supported only from release 3.1 onward.

1. Install RiskMinder (see page 68).

   Note: While installing RiskFort 3.1.01, ensure that you specify the same primary and backup database details from arcotcommon.ini in the $ARCOT_HOME/conf/ directory.

2. Verify the database setup (see page 78).
3. Prepare the application server (see page 78).
4. Deploy Administration Console (see page 86).
5. Log in to Administration Console (see page 89).

   Important! Ensure that you use the current MA password and *not* the default password, because the MA password has been reset during the bootstrap process that you performed during 2.x installation.

6. Start the RiskMinder Server (see page 92).
7. Start the Case Management Queuing Server (see page 92).
8. Verify the installation (see page 96).

   Note: If there are any warnings during the Server startup and if your transactions fail, then the upgrade has not been performed successfully. You can revert to your initial setup by following the steps listed in (In Error Scenario Only) Reverting to Your Initial Setup (see page 168).

9. Deploy User Data Service (see page 93).
10. Deploy Sample Application (see page 95).
11. Use the Sample Application (see page 96) to test the migration by verifying whether the user accounts and the related data from the earlier setup have been successfully migrated to the new database.
12. Apply the post-installation checklist (see page 100).

Reinstalling RiskMinder on a Distributed System

Perform the tasks described in the following sections to reinstall RiskMinder on a distributed system:

Important! Use the database that you had migrated earlier during the upgrade operation.

Important! The information in these sections applies to both a fresh installation of RiskMinder and an upgrade of an existing RiskMinder installation. Some of the steps that are mentioned in these sections do not apply in an upgrade scenario. For example, MySQL-related steps are applicable only for an upgrade from release 3.1 because MySQL is supported only from release 3.1 onward.

1. Installing on the First System (see page 106)
2. Verifying the Database Setup (see page 117)
3. Preparing Your Application Server (see page 118)
4. Deploying Administration Console (see page 125)
5. Logging In to Administration Console (see page 128)
6. Starting RiskMinder Server (see page 131)
7. Starting the Case Management Queuing Server (see page 131)
8. Verifying the Installation (see page 134)
9. Deploying User Data Service (see page 132)
10. Installing on the Second System (see page 135)
11. Deploying Sample Application on the Second System (see page 136)
12. Configuring Sample Application for Communication with RiskMinder Server (see page 137)
13. Using Sample Application (see page 138)
14. Applying the Post-Installation Checklist (see page 142)

(In Error Scenario Only) Reverting to Your Initial Setup

During upgrade, if there are any warnings during the Server startup and if your transactions fail, then you might want to revert to your initial setup.

To revert to the initial setup:

1. Uninstall RiskMinder 3.1.01.

   Refer to chapter, "Uninstalling RiskMinder" (see page 185) for more information.

2. Install the RiskMinder release to which you want to revert. For example, 1.*x* or 2.*x*.

   Note: For installation instructions, see the *CA RiskMinder Installation and Deployment Guide* that is shipped with the corresponding release.

3. Navigate to the location where ARCOT_HOME_BACKUP directory is available.

4. Copy the contents of ARCOT_HOME_BACKUP to your current ARCOT_HOME.

5. Replace the libArcotAccessKeyProvider.so file in *<JAVA_HOME used by Application Server>*/jre/bin with the backup that you created while performing the procedure described in Migrating the Database to Release 2.2.7 for Arcot Common Components (see page 157).

6. Deploy the Web components, such as the Administration Console and UDS.

7. Restore the database from the backup that you had taken before you began the upgrade procedure.

8. Start RiskMinder Server and Case Management Queuing Server.

9. Test the installation.

Performing Post-Upgrade Tasks

Performing Post-Upgrade Tasks

This section describes the tasks that you must perform after upgrading to release 3.1.01.

Follow these steps:

1. If you disabled database replication before upgrade, then after you upgrade to RiskMinder 3.1.01 you must enable replication for the backup database.
2. If you configured SSL for the following ports in RiskMinder 2.2.7:
   - Port 7980 for Server Management protocol of the RiskMinder Server instance
   - Port 7780 for Case Management Queuing Administration protocol of the Case Management Queuing Server instance

   then, you must reconfigure SSL as follows:
   - Between Administration Console and RiskMinder Server: Port 7980
   - Between Administration Console and Case Management Queuing Server: Port 7780

   This configuration is required because most administrative tasks, such as instance management and protocol configuration, are done using these ports in Administration Console in RiskMinder 3.1.01.

Note: For the instructions on setting up SSL between Administration Console and RiskMinder Server or Case Management Queuing Server, see chapter, "Configuring SSL" in the CA RiskMinder Administration Guide.

Set the Base Currency Code for your organization from the Miscellaneous Configurations screen.

Note: For more information about setting the organization-specific base currency code, see chapter, "Managing Global Configurations" in the CA RiskMinder Administration Guide.

1. If there are any rules with a score of 0 and you want to use these rules for scoring, then change the score to a nonzero value, like 1 or 2.

Replacing Deprecated Rules with New Rules

Four of the predefined rules have been deprecated in release 3.1. Alternative rules have been introduced for these deprecated rules. The following table lists the deprecated and new rules and rule mnemonics:

Deprecated Rule Name and Rule Mnemonic	New Rule Name and Rule Mnemonic
DeviceID Known (DEVICEIDCHECK)	Unknown DeviceID (UNKNOWNDEVICEID)
Device MFP Match (SIGMATCH)	Device MFP Not Match (MFPMISMATCH)

User Associated with DeviceID (USERDEVICEASSOCIATED)	User Not Associated with DeviceID (USERDEVICENOTASSOCIATED)
User Known (USERKNOWN)	Unknown User (UNKNOWNUSER)

Important! Although these rules have been deprecated, they are still available and can be used after the upgrade. However, it is recommended that you replace each deprecated rule with the corresponding new rule by making the required changes in the rule expression.

For any of the four deprecated rules, if the rule evaluates to No, then the rule is considered to have matched. It is then used for scoring. In contrast, each of the other predefined rules is considered to have matched when they evaluate to Yes.

In each of the four new rules that is introduced in release 3.1, if the rule evaluates to Yes, then the rule is considered to have matched. In this way, the four new rules are consistent with the other predefined rules.

The following table lists examples that highlight the difference between the deprecated rules and new rules:

Sample Use Case	**Deprecated Rule**	**Deprecated Rule Result**	**New Rule**	**New Rule Result**
User does not exist in the RiskMinder database.	USERKNOWN	No	UNKNOWNUSER	Yes
DeviceID does not exist in the RiskMinder database.	DEVICEIDCHECK	No	UNKNOWNDEVICEID	Yes
MFP does not exist in the RiskMinder database.	SIGMATCH	No	MFPMISMATCH	Yes
User is not associated with the DeviceID.	USERDEVICEASSOCIATED	No	USERDEVICENOTASSOCIATED	Yes

Follow these steps::

1. Log in to the administration console.
2. In the Rule Configurations Report for all organizations and rulesets, check whether any of the mnemonics listed in the Rule expression column of the report belong to the list of deprecated mnemonics. If a rule uses a deprecated mnemonic and if you do not want to use the deprecated mnemonic, use the corresponding new mnemonic.

   To modify a rule expression:

   a. Log in to the administration console as the GA or OA.

   b. If you have logged in as the GA and you want to perform this procedure for a system ruleset, click the Services and Server Configurations tab.

   c. If you have logged in as the GA or OA to perform this procedure for a single organization:

      Activate the Organizations tab.

      Click the Search Organization link under Manage Organizations.

      Click the Search button on the Search Organization page to display the list of organizations.

      Click the name of the organization.

      Click the RiskFort Configuration tab.

   d. Under the Rules Management section on the side-bar menu, click the Rules and Scoring Management link.

      The Rules and Scoring Management page appears.

   e. From the Select a Ruleset list, select the ruleset for which this configuration is applicable. The configuration information for the specified ruleset appears.

   f. Click the rule that you want to modify.

      The Rule Builder page opens.

   g. Make the required changes in the Rule being developed text field.

   h. Save the changes and close the Rule Builder page.

3. Migrate the modified rule to the production environment, and then refresh the cache.

Note: For detailed information about migrating a rule to the production environment and refreshing the cache, see the CA RiskMinder Administration Guide.

Replacing Deprecated Rules with New Rules

Four of the predefined rules have been deprecated in release 3.1. Alternative rules have been introduced for these deprecated rules. The following table lists the deprecated and new rules and rule mnemonics:

Deprecated Rule Name and Rule Mnemonic	New Rule Name and Rule Mnemonic
DeviceID Known (DEVICEIDCHECK)	Unknown DeviceID (UNKNOWNDEVICEID)
Device MFP Match (SIGMATCH)	Device MFP Not Match (MFPMISMATCH)
User Associated with DeviceID (USERDEVICEASSOCIATED)	User Not Associated with DeviceID (USERDEVICENOTASSOCIATED)
User Known (USERKNOWN)	Unknown User (UNKNOWNUSER)

Important! Although these rules have been deprecated, they are still available and can be used after the upgrade. However, it is recommended that you replace each deprecated rule with the corresponding new rule by making the required changes in the rule expression.

For any of the four deprecated rules, if the rule evaluates to No, then the rule is considered to have matched. It is then used for scoring. In contrast, each of the other predefined rules is considered to have matched when they evaluate to Yes.

In each of the four new rules that is introduced in release 3.1, if the rule evaluates to Yes, then the rule is considered to have matched. In this way, the four new rules are consistent with the other predefined rules.

The following table lists examples that highlight the difference between the deprecated rules and new rules:

Sample Use Case	Deprecated Rule	Deprecated Rule Result	New Rule	New Rule Result
User does not exist in the RiskMinder database.	USERKNOWN	No	UNKNOWNUSER	Yes
DeviceID does not exist in the RiskMinder database.	DEVICEIDCHECK	No	UNKNOWNDEVICEID	Yes

MFP does not exist in the RiskMinder database.	SIGMATCH	No	MFPMISMATCH	Yes
User is not associated with the DeviceID.	USERDEVICEASSOCIATED	No	USERDEVICENOTASSOCIATED	Yes

Follow these steps:

1. Log in to the administration console.
2. In the Rule Configurations Report for all organizations and rulesets, check whether any of the mnemonics listed in the Rule expression column of the report belong to the list of deprecated mnemonics.
3. If a rule uses a deprecated mnemonic and if you do not want to use the deprecated mnemonic, use the corresponding new mnemonic.

   To modify a rule expression:

   a. Log in to the administration console as the GA or OA.

   b. If you have logged in as the GA and you want to perform this procedure for a system ruleset, click the Services and Server Configurations tab.

   c. If you have logged in as the GA or OA to perform this procedure for a single organization:

      Activate the Organizations tab.

      Click the Search Organization link under Manage Organizations.

      Click the Search button on the Search Organization page to display the list of organizations.

      Click the name of the organization.

      Click the RiskFort Configuration tab.

   d. Under the Rules Management section on the side-bar menu, click the Rules and Scoring Management link.

      The Rules and Scoring Management page appears.

   e. From the Select a Ruleset list, select the ruleset for which this configuration is applicable.

      The configuration information for the specified ruleset appears.

   f. Click the rule that you want to modify.

      The Rule Builder page opens.

   g. Make the required changes in the Rule being developed text field.

   h. Save the changes and close the Rule Builder page.
4. Migrate the modified rule to the production environment, and then refresh the cache.

   Note: For detailed information about migrating a rule to the production environment and refreshing the cache, see the *CA RiskMinder Administration Guide*.

Reviewing Configuration Changes After Upgrade

This section lists the changes that you can expect to see after you upgrade to RiskMinder 3.1.

Silent Execution of Rules

A rule whose score is 0 is considered to be a silent rule. Such a rule is not used for scoring. This feature allows you to observe how a rule would execute during transactions, without the risk of unintended effects on end users. In earlier releases, a rule whose score is 0 always generates the ALLOW advice.

Deleted Rules Listed in the Active Set

When you delete a rule, it continues to be displayed in the active set. In addition, a message stating the rule is deleted is displayed in the proposed set.

Deleting Rulesets

You can delete rulesets that are not currently assigned to any organization.

Custom Actions

You can add custom actions and then use these actions to build rules. For more information, see Adding Custom Actions.

Instance and Protocol Configuration

Logging parameters, such as log directory, log file size, log backup directory, log level, and log timestamps, which existed in the riskfortserver.ini file can now be edited from the Instance Management page in Administration Console.

Server parameters, such as maximum threads and minimum threads, which existed in the riskfortserver.ini file can now be edited from the Protocol Configuration page in Administration Console.

Model Configuration

Model Configuration is performed at the global level and is no longer specific to rulesets. Only the Master Administrator can edit the model configuration parameters. The Global Administrator can enable or disable the model at the global level and at the organization level.

User Creation Mode

The **User Creation Mode** configuration that was available at the ruleset level in previous releases is now available as **User Enrollment Mode** at the organization level.

Machine FingerPrint (MFP) Threshold

MFP Threshold configuration parameter in previous releases is now part of the Device MFP Not Match rule.

Reverse Lookup Configuration

After upgrade, reverse lookup configuration for Device MFP and IP address are available at the channel level. You can configure these parameters, **Enable Reverse Lookup for Device Identification** and **Use IP Address for Reverse Lookup,** on the Miscellaneous Configurations page.

Annotation in Risk Evaluation API Response

The Risk Evaluation API response contains all rule results in a field called *annotation*. In RiskMinder 1.7.0.3, the annotation field contained the rule results, USERDIDMATCH=Y or USERDIDMATCH=N, though USERDIDMATCH was not a rule available on Administration Console. This issue was resolved in RiskMinder 3.0 and now the annotation field contains only the results of rules that are configured through Administration Console. If your calling application used this annotation in RiskMinder 1.7.0.3 and you require this feature after upgrade, you can use the USERDEVICEIDASSOCIATED rule, which is equivalent to the USERDIDMATCH rule.

Rules Based on User Device Association and DeviceID-MFP Match

RiskMinder 1.*x* had Base Combination rules. From RiskMinder 1.7, you could configure these rules in Administration Console. These rules were based on User-DeviceID match and Machine FingerPrint match rules and were separate from Standalone rules in Administration Console. After upgrading to RiskMinder 3.1, you can use the **User Associated with DeviceID** (USERDEVICEASSOCIATED) and **Device MFP Match** (SIGMATCH) rules to re-create these combination rules with appropriate rule mnemonics.

The default score for the combination rules in RiskMinder releases 1.5.1.6 and earlier was as follows:

- USERDEVICEASSOCIATED AND SIGMATCH: 10
- NOT (USERDEVICEASSOCIATED) AND SIGMATCH: 65
- USERDEVICEASSOCIATED AND NOT (SIGMATCH): 65
- NOT (USERDEVICEASSOCIATED) AND NOT (SIGMATCH): 85

The default score for the combination rules in RiskMinder releases 1.5.1.7 and later till 2.0 was as follows:

- USERDEVICEASSOCIATED AND SIGMATCH: 10
- NOT (USERDEVICEASSOCIATED) AND SIGMATCH: 65
- USERDEVICEASSOCIATED AND NOT (SIGMATCH): 65
- NOT (USERDEVICEASSOCIATED) AND NOT (SIGMATCH): 65

Ruleset Configuration

The following ruleset configurations are not available after the upgrade:

- Creating a new ruleset by referring to another ruleset
- Editing rule configurations to refer to another ruleset
- Edit a rule to copy from another ruleset

Amount Check Rule

If you had an Amount Check rule for an organization associated with a channel that does not have the AMOUNT element, then you must manually re-create this rule after the upgrade. If your rule needs to set different thresholds for different currencies, then you must add AMOUNT as a channel element. If you expect transactions based on only a single currency, then you can create a simple numeric comparison rule using the CUSTOM element in Rule Builder.

Note: The DEFAULT channel does not have the AMOUNT element. Note the configuration of the Amount Check rule before upgrade and re-create after upgrade, if required.

New Rules and Deprecated Rules

Four of the predefined rules have been deprecated in this release. Alternative rules have been introduced for these deprecated rules. The following table lists the deprecated and new rules and rule mnemonics:

Deprecated Rule Name and Rule Mnemonic	**New Rule Name and Rule Mnemonic**
DeviceID Known (DEVICEIDCHECK)	Unknown DeviceID (UNKNOWNDEVICEID)
Device MFP Match (SIGMATCH)	Device MFP Not Match (MFPMISMATCH)
User Associated with DeviceID (USERDEVICEASSOCIATED)	User Not Associated with DeviceID (USERDEVICENOTASSOCIATED)
User Known (USERKNOWN)	Unknown User (UNKNOWNUSER)

Important! Although these rules have been deprecated, they are still available and can be used after you upgrade to release 3.1. However, it is recommended that you replace each deprecated rule with the corresponding new rule by making the required changes in the rule expression.

For any of the four deprecated rules, if the rule evaluates to No, then the rule is considered to have matched. It is then used for scoring. In contrast, each of the other predefined rules are considered to have matched when they evaluate to Yes.

In each of the four new rules introduced in release 3.1, if the rule evaluates to Yes, then the rule is considered to have matched. In this way, the four new rules are consistent with the other predefined rules.

Rule Migration

All rules are migrated to the DEFAULT channel for all Actions supported by default in the system.

Rule Execution Priority

After you upgrade from RiskMinder 2.*x*, you do not have to enable or disable the rules for execution. The execution priority is automatically determined by the system.

Secondary Authentication Result

Transactions in RiskMinder 2.2.5.11 that had the **Secondary Authentication Result** status Not Available now appear with the status Abandoned after the upgrade.

Untrusted IP Type Configuration After Upgrade

RiskMinder releases prior to 1.7 allowed you to configure Negative IP Types as Active, Suspect, or Private from the Administration Console. From RiskMinder 1.7, the Active, Suspect, Private, Inactive, and Unknown negative type categories are derived from the data provided by our Intelligence Partner. So, if you had configured any Negative IP Type as Active, Suspect, or Private in your RiskMinder 1.6.0.*x* or earlier deployments, then after upgrading to 3.1, these IP types are migrated to the "Negative" category of the Untrusted IP Type.

Cache Refresh

After you upgrade from RiskMinder release 2.*x* or later, you can refresh the cache of all server instances from Administration Console. If you choose to use the command-line option, you must now refresh the server instances using the arrfclient tool instead of the arrfadmin tool.

Case Assignment After Upgrade

After you upgrade from RiskMinder release 2.*x* or later, all cases that were generated in the previous release continue to remain assigned to the Default Queue for the organization.

Note: In RiskMinder 2.0, cases were assigned to each Customer Support Representative (CSR), but from RiskMinder 2.2 onwards, cases are not assigned to individual CSRs. For more information, see the *CA RiskMinder Administration Guide*.

All new cases that are generated after you upgrade to RiskMinder 3.1 are assigned to the relevant Queue according to the Queue criteria defined by the Queue Manager in RiskMinder 3.1.

Calling Application Code Changes

The following list describes the changes to the calling application code after upgrade:

- The older Java SDK client will continue to work with the new installation of RiskMinder Server. The client code will not require any modification if you continue to use the old SDK. However, the new SDK provides additional functionality and it is recommended that you integrate the calling application code with the latest release of SDK.
- Applications integrated using old Risk Evaluation WSDL will continue to work without modification in the code.

Note: For RiskMinder 1.x releases, Web services were built as a WAR implementation. The client must continue to point to the old Web service even after upgrading to RiskMinder 3.1.
In RiskMinder releases 2.0 and later including RiskMinder 3.1, Web services are implemented as part of RiskMinder Service and not as a WAR. It is recommended that you integrate your applications using the new WSDL and configure your application to RiskMinder Service according to the new architecture.

- In previous releases, the Issuance Java API provided a programmable interface, which could be used by Java clients (such as Java Servlets and JSP pages) to send Issuance-related requests to RiskMinder Server. In RiskMinder 3.0, the Issuance API (Issuance) has been deprecated. Now, you must use the User Management Web service (ArcotUserRegistrySvc) for this purpose.
- If you were using the Exception User Web service shipped earlier, you must now use the new RiskMinder Administration Web service WSDL implemented in RiskMinder Service that provides the Exception User API.
- It is recommended that you use the enhanced RiskMinder 3.1 risk evaluation APIs that now return response codes and reason codes.

Role Privileges

After you upgrade from RiskMinder 2.*x*, you must review the privileges associated with the various roles. The following table lists the privileges that have been deleted after upgrade for the Master Administrator, Global Administrator, and Organization Administrator roles.

Role	Scope	Privileges Deleted
Master Administrator (MA)	Global	■ Update RiskFort Protocols ■ Add Add-On Rule Type
Global Administrator (GA)	Global	■ Manage Negative Countries ■ Manage Negative IP Addresses ■ Manage User Velocity Configuration ■ Manage Device Velocity Configuration ■ Manage Trusted IPs/Aggregators ■ Manage IP Velocity Configuration ■ Manage Scoring Configuration ■ Manage Miscellaneous Rule Configurations ■ Manage Negative IP Types ■ Configure Add-on Rules ■ Show GDP URL ■ View Trusted IP Addressed/Aggregators Report ■ View Negative IP Address Report ■ View Negative Country Report ■ Manage Category Based Rule Data ■ View Mapping Data Report

Role	Scope	Privileges Deleted
	Organization	■ Manage Negative Countries ■ Manage Negative IP Addresses ■ Manage User Velocity Configuration ■ Manage Device Velocity Configuration ■ Manage Trusted IPs/Aggregators ■ Manage IP Velocity Configuration ■ Manage Scoring Configuration ■ Manage Miscellaneous Rule Configurations ■ Manage Negative IP Types ■ Configure Add-on Rules ■ Manage Category Based Rule Data
Organization Administrator (OA)	Global	■ Manage Queues ■ View Trusted IP Addressed/Aggregators Report ■ View Negative IP Address Report ■ View Negative Country Report ■ View Mapping Data Report
	Organization	■ Manage Negative Countries ■ Manage Negative IP Addresses ■ Manage User Velocity Configuration ■ Manage Device Velocity Configuration ■ Manage Trusted IPs/Aggregators ■ Manage IP Velocity Configuration ■ Manage Scoring Configuration ■ Manage Miscellaneous Rule Configurations ■ Manage Negative IP Types ■ Configure Add-on Rules ■ Manage Category Based Rule Data

The following table lists the privileges that have been added after upgrade for the Master Administrator, Global Administrator, Organization Administrator, and User Administrator roles.

Role	Target	Privileges Added
Master Administrator (MA)	Global	■ Instance Management ■ View Instance Management Report ■ Model Configuration
	API	■ Get User Profile (web service) ■ Add User to Exception List (web service) ■ Delete User from Exception List (web service) ■ Get Location and Connection Info (web service)
Global Administrator (GA)	Global	■ Manage Miscellaneous Configurations ■ Reports Summary ■ Rules and Scoring Management ■ Model Configuration ■ Rebuild Queues
	Organization	■ Manage Miscellaneous Configurations ■ Assign Channel and Configure Default Account ■ Rules and Scoring Management ■ Model Configuration
	API	■ Get User Profile (web service) ■ Add User to Exception List (web service) ■ Delete User from Exception List (web service) ■ Get Location and Connection Info (web service)
Organization Administrator (OA)	Global	■ Reports Summary ■ Manage Queues ■ Rebuild Queues

Role	Target	Privileges Added
	Organization	■ Manage Miscellaneous Configurations ■ Rules and Scoring Management
	API	■ Get User Profile (web service) ■ Add User to Exception List (web service) ■ Delete User from Exception List (web service) ■ Get Location and Connection Info (web service)
User Administrator (UA)	Global	■ Reports Summary
	API	■ Get User Profile (web service) ■ Add User to Exception List (web service) ■ Delete User from Exception List (web service) ■ Get Location and Connection Info (web service)

Chapter 8: Uninstalling RiskMinder

Before you uninstall RiskMinder, remove its schema and then proceed with the uninstallation process. You can run the uninstaller file (Uninstall_Arcot RiskFort) to remove RiskMinder from your system. After you complete the uninstallation, perform the post-uninstallation tasks to clean up the residual WAR files and entries.

This section guides you through the steps for uninstalling RiskMinder and its components. The section covers the following sections:

1. Dropping RiskMinder Schema (see page 186)
2. Uninstalling RiskMinder Server (see page 187)
3. Performing Post-Uninstallation Tasks (see page 189)

Dropping RiskMinder Schema

Note: If for some reason, you want to retain the database schema, then *do not* proceed with the instructions in this section.

Important! You may be using both CA RiskMinder and CA AuthMinder. If you plan to uninstall only RiskMinder, then:

- If you had first installed RiskMinder and then installed AuthMinder, first drop the AuthMinder schema and then drop the RiskMinder schema.
- If you had first installed AuthMinder and then installed RiskMinder, drop only the RiskMinder schema. You need not drop the AuthMinder schema.

Note that if you plan to uninstall both products, then you can drop the schemas in any order.

Refer to the section, "Uninstalling RiskMinder Server" (see page 187) to proceed with the uninstallation.

To uninstall the RiskMinder database:

1. Navigate to the following directory:
   `<install_location>/arcot/dbscripts/`
2. Based on the database that you are using, navigate to:
   - **For Oracle Database:**
     `<install_location>/arcot/dbscripts/oracle/`
   - **For Microsoft SQL:**
     `<install_location>/arcot/dbscripts/mssql/`
   - **For MySQL:**
     `<install_location>/arcot/dbscripts/mysql/`
3. Run the scripts in the *following* order to drop all database tables of RiskMinder and related components:
   a. Run drop-riskfort-3.1.01.sql.
   b. If applicable, run drop-arcot-common-2.0.sql.
   c. If you have not installed or upgraded to CA AuthMinder release 7.1.01, run drop-riskfort-3dsecure-3.1.01.sql.

   Note: The drop-arcot-common-2.0.sql script is used to remove the schema for Arcot common components. This schema is used by both AuthMinder and RiskMinder. If you have already (successfully) installed AuthMinder, you must not drop this schema because AuthMinder can continue to use it.
4. If you have no further use for the database user account that you had created for the RiskMinder schema, delete that user account.

Uninstalling RiskMinder Server

To uninstall RiskMinder Server, you need to remove the files shipped with RiskMinder. Uninstallation also deletes the scripts that are required to uninstall the database. If you want to remove the RiskMinder database, then see "Dropping RiskMinder Schema" **(see page 186)** before proceeding.

Important! If you had first installed RiskMinder and then installed AuthMinder, first uninstall AuthMinder Server and then uninstall RiskMinder Server. In other words, uninstall these products in the reverse of the order in which you installed them.

To uninstall RiskMinder Server:

1. Shut down the following components gracefully:
   - RiskMinder Server
   - Case Management Queuing Server
   - Any application servers where other RiskMinder components are deployed
2. Close Administration Console, if open.
3. Ensure that all INI and other files that are related to RiskMinder configuration are closed.
4. Change to the arcot/ directory.
5. Use the following command to start the uninstallation of RiskMinder:
   `sh <install_directory>/arcot/"Uninstall_Arcot RiskFort"/Uninstall Arcot RiskFort`

   The Uninstall Arcot RiskFort screen appears.
6. In the wizard window:
   - Specify **1** to select the **1-Completely remove all features and components.** option, which enables you to uninstall *all* installed components of RiskMinder.
   - Specify **2** to select the **2-Choose specific features that were installed by InstallAnywhere.** option, which enables you to uninstall only the selected components from the current system.

   Important! To **Uninstall Specific Features**, follow the reverse sequence of the order in which you installed the components. For example, if you installed RiskMinder Server and then Administration Console, then first uninstall Administration Console and only then uninstall RiskMinder Server.
7. Press **Enter** to confirm and continue with the uninstallation:
   - If you specified **1**, then go to Step 9.

   Note: You may have to wait for a few minutes for the uninstallation to complete.
   - If you specified **2**, then go to Step 8.

If you specified **2**, then the Choose Product Features screen appears. This screen displays the RiskMinder components that are installed on the current system.

8. (**For Uninstalling Specific Components Only**) Enter the component numbers (separated by comma) and press **Enter**.

   Note: You may have to wait for a few minutes for the uninstallation to complete.

   After the uninstallation is completed, the Uninstall Complete screen appears and you are returned to the command prompt.

9. Press **Enter** to exit the wizard and complete the uninstallation.

Performing Post-Uninstallation Tasks

Perform the following steps to ensure that all the RiskMinder components are removed:

1. Delete the <*install_location*>/**arcot**/ directory, if it is not required after uninstallation.

   Note: If multiple Advanced Authentication products are installed on this system, then delete this directory *only if* RiskMinder is the last product to be uninstalled.

2. Stop the application server.

3. Undeploy the following WAR files from the appropriate sub-directory in *<APP-SERVER-HOME>*.

   Note: Here, *APP-SERVER-HOM*E represents the directory path where the application server (for example, Apache Tomcat) is installed.

   See the application server vendor documentation for detailed information about undeploying the WAR files.

   - arcotadmin.war: Administration Console
   - arcotuds.war: User Data Service, if deployed
   - riskfort-3.1.01-sample-application.war: Sample Application
   - riskfort-3.1.01-sample-callouts.war: Sample Callout

   Note: If you have a distributed-system deployment, then locate these files on the system where you have deployed the particular application.

4. If you used Oracle Database for the database, then delete the tabspace_arreports_<*time_database_was_created*>.dat file from the system running the RiskMinder database.

5. If not automatically deleted, delete the DSN entry that you created during RiskMinder installation.

   To delete this entry, navigate to the odbc.ini file, open it by using a text editor, and delete the corresponding database entry. Based on your ODBC setup, this file may be available at *one* of the following locations:

   - /etc/odbc.ini
   - /usr/local/etc/odbc.ini

Appendix A: RiskMinder Directory Structure

This appendix provides the information about the location of all files that are installed by the RiskMinder installer. It covers:

RiskMinder Directory Structure

The following table lists the main directories, files, and JARs that are created by the RiskMinder installer. It also describes specific subdirectories and files that have been referred to in this guide.

Note: In addition to the files and directories discussed in the table, you will also see an empty file called arcotkey in the arcot directory. This file is used by the installer to detect previously installed Advanced Authentication products. If you delete this file, then the installer will not be able to detect previously installed Advanced Authentication products, and will allow new installations to be performed in any location. As a result, the installer will not be able to ensure the same destination directory for multiple Advanced Authentication products and components, in which case, the products (or components) may not work, as expected. This file has no impact on patches and upgrade.

Directory	Used By	File Names and Description
<*install_location*>/arcot/**bin**/ **Note:** See *CA RiskMinder Administration Guide* for more details on these tools.	■ RiskMinder Server ■ Case Management Queuing Server	Contains the following scripts used by RiskMinder Server: ■ casemanagementserver (Tool for refreshing and gracefully shutting down the Case Management Queuing Server.) ■ riskfortserver (Tool for setting the server management port and other server-related operations.)

Directory	Used By	File Names and Description
<*install_location*>/arcot/**conf**/ **Note:** See appendix, "Configuration Files and Options" (see page 201) for more details on the configuration files that you see in this directory.	■ Administration Console	Contains the following configuration files used by Administration Console: ■ adminserver.ini (Used for reading Administration Console logging configurations.) ■ arcotcommon.ini (Used for connecting to RiskMinder database, RiskMinder instances, and Hardware Security Module (HSM), if configured.)
	■ RiskMinder Server	Contains the following configuration files for use by RiskMinder Server and other RiskMinder components: ■ arcotcommon.ini(Used for connecting to RiskMinder database, RiskMinder instances, and Hardware Security Module (HSM), if configured.) ■ riskfortdataupload.ini (Used for uploading Quova data to RiskMinder database.) ■ securestore.enc(Used for storing the encrypted information needed to connect to the RiskMinder database.)
	■ UDS	Contains the udsserver.ini file for use by UDS for reading UDS logging configurations.
	■ UDS ■ Administration Console	The resourcebundles directory contains the properties files for common errors thrown by Administration Console and UDS.
<*install_location*>/arcot/**dbscripts**/	■ Administration Console ■ RiskMinder Server ■ UDS	Contains the database scripts to create and drop RiskMinder schemas for the Database Type (Oracle, MS SQL, or MySQL) that you specified during installation.

Directory	Used By	File Names and Description
<*install_location*>/arcot/docs/**riskfort**/	■ Administration Console ■ RiskMinder Server	Contains the following zipped WSDLdoc: ■ Arcot-RiskFort-3.1.01-AdminWeb Service-wsdldocs.zip (The WSDLDocs for the Admin Web Service.)
	■ RiskMinder Server	Contains the following zip and XSD files for writing Callouts, and the Javadocs and WSDLdocs for Risk Evaluation SDKs: ■ Arcot-RiskFort-3.1.01-CallOutInterface-xsds.zip (The Evaluation and Scoring Request and Response files that are required for writing a Callout.) ■ Arcot-RiskFort-3.1.01-risk-evaluation-sdk-javadocs.zip ■ Arcot-RiskFort-3.1.01-risk-evaluation-wsdldocs.zip
<*install_location*>/arcot/docs/**uds**/	■ UDS	Contains the following zipped WSDLdoc: ■ arcot-uds-2_0-wsdl-docs.zip (The WSDLDocs for UDS Web Services.)
<*install_location*>/arcot/**java**/**lib**/	■ Administration Console	Contains an empty directory called **sdk** and the following WAR and JAR files required by the Administration Console Framework and UDS: ■ adminframework.jar ■ adminframework.war ■ arcot-common.jar ■ arcot-crypto-util.jar ■ arcot-euds.jar ■ bcprov-jdk15-146.jar ■ udsframework.war

Directory	Used By	File Names and Description
<*install_location*>/arcot/**java/webapps/**	■ Administration Console	Contains the following WAR file required by Administration Console: ■ arcotadmin.war (The WAR file required to deploy Administration Console.)
	■ UDS	Contains the arcotuds.war file required to deploy UDS for: ■ LDAP connectivity ■ Access to UDS Web services ■ Authentication and Authorization for Web services
<*install_location*>/arcot/lib/	■ RiskMinder Server ■ Case Management Queuing Server	Also contains the following library files used by RiskMinder Server: ■ libdminwsprotocol.so ■ libaradminprotocol.so ■ libarrfuds.so ■ libarrfudswrapper.so ■ libarriskengine.so ■ libnamevaluexref.so ■ libsrvmgrwsprotocol.so ■ libtranswsprotocol.so
<*install_location*>/arcot/**logs/** **Note:** See appendix, "RiskMinder Logging" in the *CA RiskMinder Administration Guide* for detailed information about these log files.		Contains the log files used by Administration Console, Case Management, RiskMinder, and UDS. You can use the **backup** subdirectory to store the older logs, if available.
	■ Administration Console	■ arcotadmin.log
	■ RiskMinder Server	■ arcotriskfort.log ■ arcotriskfortstartup.log
	■ Case Management Queuing Server	■ arcotriskfortcasemgmtserver.log ■ arcotriskfortcasemgmtstartup.log

Directory	Used By	File Names and Description
	■ UDS	■ arcotuds.log **Note:** This log appears only if you deployed the UDS WAR file (arcotuds.war) for LDAP connectivity.
<*install_location*>/arcot/**native**/	■ Administration Console ■ UDS	Contains libArcotAccessKeyProvider.so (in appropriate subdirectories) used for reading the contents of securestore.enc for your 32-bit or 64-bit OS platform (RHEL, Solaris SPARC, or Microsoft Windows).
<*install_location*>/arcot/**odbc32v70wf**/	■ RiskMinder Server	Contains the CA-branded DataDirect ODBC libraries for all the databases supported by RiskMinder.
<*install_location*>/arcot/**plugins/rules**/	■ RiskMinder Server	Contains SO (library binary) files to support all out-of-box RiskMinder rules, and Scoring.
<*install_location*>/arcot/**resourcepacks**/	■ Administration Console ■ UDS	Contains the required Administration Console and Advanced Authentication product pack bundles: ■ bundle_adminconsole.zip ■ bundle_riskfort.zip Also contains the **i18n** subdirectory.
<*install_location*>/arcot/**samples/java**/	■ RiskMinder Server ■ RiskMinder Risk Evaluation SDK	The **java** subdirectory contains the sample WAR files for: ■ riskfort-3.1.01-sample-application.war to deploy the RiskFort Sample Application. ■ riskfort-3.1.01-sample-callouts.war to deploy the RiskFort Sample Callout.

Directory	Used By	File Names and Description
<*install_location*>/arcot/**sbin**/	■ RiskMinder Server ■ Case Management Queuing Server	Contains library files and following executable files required by administrators: ■ arrfcasemgmtserver: This tool is used for refreshing and gracefully shutting down the Case Management Server. ■ arrfclient: This tool is used for refreshing and gracefully shutting down RiskMinder Server. ■ arrfenv: This script is used to set the required environment variables. ■ arrfserver: This tool for setting the server management port and other server-related operations. ■ arrfupload: This utility is used for uploading Quova data to RiskMinder database. ■ arrfutil.wrapper: This is a wrapper for running all other command-line tools provided by RiskMinder. ■ arrfwatchdog: This tool monitors the server health and also starts the server if it stops. ■ arversion: This tool determines the release of the library files.

Directory	Used By	File Names and Description
<*install_location*>/arcot/**sdk**/	■ RiskMinder Risk Evaluation SDK	Contains SDKs and dependent files supported by RiskMinder in the **c**, **devicedna**, and the **java** flavors. The **devicedna** subdirectory contains the accompanying JavaScripts and Flash files that are used by these SDKs and the MFP and DeviceDNA modules. See section "RiskMinder Risk Evaluation Java SDK Files" (see page 198) later in this appendix for detailed explanation of the contents of this directory.
<*install_location*>/arcot/**tools**/	■ Administration Console	The **common** subdirectory contains the following subdirectories: ■ The **arreporttool** subdirectory contains the report command-line utility that enables you to export (or download) reports. ■ The **bundlemanager** subdirectory contains the files that are required by Administration Console Resourcepack. ■ The **uds-monitor** subdirectory contains the script for checking the health of UDS.
<*install_location*>/arcot/**tools**/<**platform**>/ The <*platform*> can be: linux, solsparc, and win.	■ Administration Console ■ User Data Service (UDS)	Contains the DBUtil tool for your OS platform (RHEL, Solaris SPARC, or Microsoft Windows). This tool is required for editing securestore.enc, which stores the encrypted information needed by RiskMinder Server to connect to the RiskMinder database.

Directory	Used By	File Names and Description
<*install_location*>/arcot/**Uninstall_Arcot RiskFort/**	■ RiskMinder Server	Contains the files required to uninstall RiskMinder. In addition, ■ The **jre** subdirectory contains all the files that are required for Java Runtime Environment (JRE) support: – Java Virtual Machine – Runtime Class Libraries – Java Application Launcher
<*install_location*>/arcot/**wsdls/**	■ RiskMinder Server	Contains the WSDL files required by Administration Console (the **admin** subdirectory), RiskMinder (the **riskfort** subdirectory), and UDS (the **uds** subdirectory). See section, "RiskMinder Risk Evaluation Java SDK Files" (see page 198) later in this appendix for detailed explanation of the contents of this directory.

RiskMinder Risk Evaluation Java SDK Files

The following table lists the directory location of the files that are used by Risk Evaluation Java SDK.

Directory	File Description
<*install_location*>/arcot/**docs/riskfort/**	Contains the Arcot-RiskFort-3.1.01-risk-evaluation-sdk-javadocs.zip file, which contains the Javadocs for Risk Evaluation SDK.
<*install_location*>/arcot/**samples/java/**	Contains the following: ■ riskfort-3.1.01-sample-application.war (For deploying Sample Application.) ■ riskfort-3.1.01-sample-callouts.war (For deploying the Sample Callout Server shipped with the product.) **Note:** See *CA RiskMinder Administration Guide* for more information about how to deploy and use this Sample Callout.

Directory	File Description
<*install_location*>/arcot/**sdk/**	Contains SDKs and dependent files supported by RiskMinder.
<*install_location*>/arcot/**sdk/c/**	Contains the library and included files required for C SDK.
<*install_location*>/arcot/**sdk/devicedna/**	The directory contains: ■ riskminder-client.js, which is required for collecting DeviceDNA information at the client-end. ■ riskminder-client.swf, which is required for migrating Flash-based cookies from the preceding releases to one of the stores that this release supports.
<*install_location*>/arcot/**sdk/java/**	■ The **lib** subdirectory contains the CA-supplied and third-party JAR files used by the product. **Book:** See the Third-Party Software Licenses document in the package for the licensing information of these third-party JARs. ■ The **properties** directory contains the property files that are required for configuration of RiskMinder.
<*install_location*>/arcot/**sdk/java/lib/arcot/**	Contains the following JAR files used by Risk Evaluation Java SDK. ■ arcot_core.jar ■ arcot-pool.jar ■ arcot-riskfort-evaluaterisk.jar ■ arcot-riskfort-issuance.jar ■ arcot-riskfort-mfp.jar **Note:** The Issuance API has been deprecated in this release. However, arcot-riskfort-issuance.jar ensures backward compatibility with the preceding releases.
<*install_location*>/arcot/**sdk/java/lib/external/**	Contains the third-party JAR files required by the Risk Evaluation Java SDK. ■ bcprov-jdk15-146.jar ■ commons-lang-2.0.jar ■ commons-pool-1.5.5.jar
<*install_location*>/arcot/**sdk/java/properties/**	Contains the following files: ■ log4j.properties.risk-evaluation ■ riskfort.risk-evaluation.properties

RiskMinder WSDL Files

The following table lists the directory location of the files that are used by Risk EvaluationWSDLs.

Directory	File Description
<*install_location*>/arcot/**docs/riskfort/**	Contains the zipped WSDLdocs for RiskMinder Risk Evaluation and Administration Console: ■ Arcot-RiskFort-3.1.01-AdminWebService-wsdldocs.zip ■ Arcot-RiskFort-3.1.01-risk-evaluation-wsdldocs.zip
<*install_location*>/arcot/**docs/uds/**	contains the arcot-uds-2_0-wsdl-docs.zip file required by UDS. This WSDL describes the UDS Web services and how to access them.
<*install_location*>/arcot/**wsdls/admin/**	Contains the ArcotRiskFortAdminWebService.wsdl file required by Administration Console. This WSDL describes the RiskMinder Administration Web services and how to access them. In addition, it can be used to add Exception Users.
<*install_location*>/arcot/**wsdls/riskfort/**	Contains the following file required by RiskMinder: ■ ArcotRiskFortEvaluateRiskService.wsdl The WSDLdoc describes the Risk Evaluation Web Service and how to access it.
<*install_location*>/arcot/**wsdls/uds/**	Contains the WSDLs and XML Schema files required by UDS. These WSDLs describe the UDS Web services and how to access them: ■ ArcotConfigManagementSvc.wsdl (WSDL for creating and managing user account types.) ■ ArcotOrganizationManagementSvc.wsdl (WSDL for creating and managing organizations.) ■ ArcotUserManagementSvc.wsdl (WSDL for creating and managing users and user accounts.) ■ ArcotUserSchema.xsd (XML Schema Definition that serves as the reference library that can be uses by your code for working with UDS Web services.)

Appendix B: Configuration Files and Options

This appendix discusses the configuration files that RiskMinder uses and the parameters that you must configure in these files. It also includes samples of these default configuration files.

The configuration files important for RiskMinder can be categorized as:

- INI Files (see page 201)
- Properties Files (see page 218)

INI Files

The plain-text INI files that are used for configuring RiskMinder include:

- adminserver.ini (see page 201)
- arcotcommon.ini (see page 204)
- riskfortdataupload.ini (see page 214)
- udsserver.ini (see page 216)

All RiskMinder configuration files are available at the following default location:
`<install_location>/arcot/conf/`

adminserver.ini

The adminserver.ini file contains the parameters to set the Administration Console log information.

Logging Configurations

The following table lists the log file information that is used by Administration Console. The common log-level values that can be set in this file are:

- FATAL
- WARNING
- INFO
- DEBUG

Note: See *CA RiskMinder Administration Guide* for more information about the log levels.

Parameter	Default Value	Description
log4j.rootCategory	ERROR, roothandle **Important!** roothandle is the name of the Administration Console log handle and *must* be specified.	The root logger that resides at the top of the logger hierarchy. All children loggers inherit this value, if no value is specified.
log4j.logger.com.arcot.euds	INFO	The log level for writing the User Data Service (UDS) information.
log4j.logger.com.arcot.admin	INFO	The log level that must be used to write the Administration Console logs.
log4j.logger.com.arcot.admin.framework	INFO	The log level that must be used to write the Administration Console Framework logs.
log4j.logger.com.arcot.adminconsole	INFO	The log level that must be used to write the Administration Console logs.
log4j.logger.com.arcot.common.cache	INFO	The log level for writing the cache-related information.
log4j.logger.com.arcot.common.crypto	INFO	The log level for writing the information related to HSM.
log4j.logger.com.arcot.crypto.impl.SecureStoreUtil	INFO	The log level that must be used to write the logs, if you are using a hardware-based or software-based HSM.

Parameter	Default Value	Description
log4j.logger.com.arcot.common.database	INFO	The log level that must be used to write the database information.
log4j.logger.com.arcot.common.ldap	INFO	The log level that must be used to write the LDAP information.
log4j.appender.roothandle	org.apache.log4j.RollingFileAppender	The root logger that resides at the top of the logger hierarchy. All children loggers inherit this value, if no value is specified.
log4j.appender.roothandle.Encoding	UTF-8	The encoding to use when writing the entries in the log file.
log4j.appender.roothandle.File	${arcot.home}/logs/**arcotadmin.log**	The log file name and the location where the Administration Console logs will be created. By default, the Administration Console log file name is arcotadmin.log and is created in the following location: <*install_location*>/arcot/**logs**/
log4j.appender.roothandle.MaxFileSize	10 MB	The maximum allowed file size of the log file.
log4j.appender.roothandle.MaxBackupIndex	100	The maximum number of backup files that can be created. When the number of backup files reaches this number, then the application starts to overwrite from the first log file.
log4j.appender.roothandle.layout	org.apache.log4j.PatternLayout	The output format, as specified by ConversionPattern.

Parameter	Default Value	Description
log4j.appender.roothandle.layout.ConversionPattern	%d{yyyy-MM-dd HH:mm:ss,SSS z} : [%t] : %-5p : %-5c{3} : %m%n	The format in which the Administration Console log file entries are written: ■ Time Stamp (%d{yyyy-MM-dd HH:mm:ss,SSS z} :) ■ Thread ID ([%t] :) ■ Log Level (or Severity) (%-5p :) ■ Logger Class (%-5c{3} :) ■ Message (%m%n) **Note:** This pattern is similar to the C language printf function.

arcotcommon.ini

The arcotcommon.ini file contains the parameters for database and instance settings for RiskMinder Server and other components (Administration Console and User Data Service) of RiskMinder. Typically, you edit the following sections in this file:

- Database Settings (see page 205)
- HSM Encryption Settings (see page 210)
- Instance Settings (see page 212)

You can also change the default startup logging settings for RiskMinder Server and Case Management Queuing Server by using arcotcommon.ini. See section, "Changing Server Startup Logging Parameters" (see page 212) for more information.

- Watchdog Settings (see page 214)

Database Settings

The database settings in arcotcommon.ini allow you to identify the database to which the server will be connected and the backup database to use for failover. These settings also enable you to configure database communications resources available between the server and the database.

Note: For notes and recommendations for database settings, refer to the "Configuring Database Server" (see page 54) section in chapter, "Preparing for Installation" (see page 45).

Edit the database settings in the following sections of the arcotcommon.ini file:

- [arcot/db/dbconfig]
- [arcot/db/primarydb]
- [arcot/db/backupdb]

[arcot/db/dbconfig]

This section enables you to specify the type of database (Oracle Database, Microsoft SQL Server, or MySQL) and generic information about this database type. The following table lists the database setting parameters in the [arcot/db/dbconfig] section.

Parameter	Default	Description
DbType	--	The type of database applicable to all database connections. The supported values are: ■ oracle ■ mssqlserver ■ mysql
Driver	--	The fully-qualified name of the database driver class that is supplied by the JDBC driver vendor. **Note:** Consult your JDBC vendor documentation for the right driver name. For example: – **Oracle Database:** oracle.jdbc.driver.OracleDriver – **Microsoft SQL Server:** com.microsoft.sqlserver.jdbc.SQLServerDriver – **MySQL:** com.mysql.jdbc.Driver
MinConnections	4	The minimum number of connections to initially create between the server and the database.

Parameter	Default	Description
MaxConnections	64	The maximum number of connections that will be created between the server and the database. **Note:** There is a limit to the number of connections that a database will allow. That limit may prevent the server from creating MaxConnections number of connections. See your database driver documentation for more information about the limit on the number of inbound connections.
IncConnections	2	The number of connections that will be created when a new connection is needed between the RiskMinder components and the database.
MaxIdleConnections	64	The maximum number of idle database connections that the server can maintain.
MaxWaitTimeForConnection	30000	The maximum time (in **milliseconds**) the server must wait for a connection to become available (when there are no available connections) before timing out.
AutoRevert	1	Whether or not the system will attempt to connect to the primary database after a failover occurs. Set AutoRevert=1, if you have a backup database configured and if you want the server to try to connect back to the primary database after a failover occurs.
MaxTries	3	The number of times the server will attempt to connect to the database before aborting the connection.
ConnRetrySleepTime	100	The number of **milliseconds** to delay between attempts to connect to the database.
MonitorSleepTime	50	The amount of time in **seconds** the Monitoring Thread sleeps between heartbeats checks on all databases.
Profiling	0	Whether the database messages are being logged. Set the value to 1 if you want to enable logging of database messages.
EnableBrandLicensing	1	Whether a branded ODBC driver is in use.

Parameter	Default	Description
BrandLicenseFile	IVWF.LIC	The license file name when you use a branded ODBC driver. This parameter is required if the value of EnableBrandLicensing is 1. Otherwise it is ignored. **Important!** If present, this value must *not* be edited.
MaxTransactionRetries	3	The maximum number of times the transaction is retried with a database instance for pre-defined error conditions.
TransactionRetrySleep Time	10	The interval in **milliseconds** between two consecutive transaction retries.

[arcot/db/primarydb]

This section enables you to specify the primary database to which the RiskMinder Server will be connected. You can configure more than one primary database by specifying the required number, *N* in the following parameters:

- Datasource.*N*
- AppServerConnectionPoolName.*N*
- URL.*N*
- Username.*N*
- TrustStorePath.*N*
- HostNameInCertificate.*N*
- KeyStorePath.*N*

The following table lists the database setting parameters in the [arcot/db/primarydb] section.

Parameter	Default	Description
Datasource.*N*	No default	The name of the ODBC System Data Source Name (DSN) pointing to the primary database hosting the server data.

Parameter	Default	Description
AppServerConnection PoolName.*N*	No default	The JNDI name used to look up the connection pool object, if the database connection pooling feature of the application server is being used. A pool by this JNDI name should be created in the containing application server, and sufficient access right must be given to CA Web applications for it to use the connection pool: ■ If the JNDI name is configured in **Apache Tomcat**, then use a fully qualified JNDI name. For example: AppServerConnectionPoolName.1=java:comp/env/SampleDS ■ For **other application servers**, specify only the JNDI name. For example: AppServerConnectionPoolName.1=SampleDS See appendix, "Configuring Application Server for Database Connection Pooling" (see page 263) for more information. If the application server connection pool is *not* required, then leave this configuration empty.
URL.*N*	No default	The name of the JDBC data source. For ■ **Oracle Database** -> jdbc:oracle:thin:<*server*>:<*database_port*>:<*sid*> ■ **Microsoft SQLServer** -> jdbc:sqlserver://<*server*>:<*database_port*>;databaseName=<*databasename*>;selectMethod=cursor ■ **MySQL** -> jdbc:mysql://<*server*>:<*database_port*>/<*database*>
Username.*N*	No default	The user ID used by the server to access the database.

Parameter	Default	Description
TrustStorePath.*N* **Note:** To be used only if you have SSL configured between RiskMinder and the database.	No default	The SSL Certificate Truststore Path corresponding to Datasource.*N*. The path (including the filename) refers to the certificate Truststore file, which contains the list of certificates that the client trusts. **Important!** The password corresponding to TrustStorePath.*N* must be securely stored in securestore.enc, with the value of TrustStorePath.*N* as the key. The DBUtil tool is used to achieve this. **Book:** See the *CA RiskMinder Administration Guide* for more information about dbutil.
KeyStorePath.*N*		**Note:** This attribute is used only for MySQL. If you want to configure one-way SSL between RiskMinder and a MySQL Database, this is one of the parameters for which you must specify a value. This parameter holds the SSL Certificate Keystore Path corresponding to Datasource.*N*. The path (including the filename) refers to the certificate keystore file. The password corresponding to KeyStorePath.*N* must be securely stored in securestore.enc with the value of KeyStorePath.*N* as the key.
HostNameInCertificate.*N* **Note:** To be used only if you have SSL configured between RiskMinder and the database.	No default	The value of Common Name (CN) in the subject Distinguished Name (DN) of Datasource.*N* SSL Certificate in Truststore.

[arcot/db/backupdb]

This section [arcot/db/backupdb] enables you to specify the backup database to use for failover. You can configure more than one failover database by specifying the required number, *N* in the following parameters:

- Datasource.*N*
- AppServerConnectionPoolName.*N*
- URL.*N*
- Username.*N*
- TrustStorePath.*N*
- HostNameInCertificate.*N*
- KeyStorePath.*N*

This section uses the same parameters as the [arcot/db/primarydb] section. Refer to the table in the previous section for the list of database setting parameters in this section.

HSM Encryption Settings

The arcotcommon.ini file enables you to specify the configurations for your Hardware Security Module (HSM). As a result, you can store the Private Keys that are used for RiskMinder in an encrypted format. The following HSMs are supported:

- Chrysalis-ITS Luna SA
- Thales nFast (nCipher netHSM)

The following table lists the common configurations for secure storage, as specified in the [arcot/crypto/device] section.

Parameter	Default	Description
HSMDevice	S/W	The mode that sets whether the RiskMinder information must be encrypted with a key stored in database or with the one in stored the HSM. Supported values are: ■ S/W: Indicates that the data will be encrypted with the key label stored in the database. ■ chrysalis: Indicates that the Chrysalis (Luna) HSM will be used to encrypt the data. ■ nfast: Indicates nFast (nCipher netHSM) will be used to encrypt data.

The following table lists the configuration parameters for Chrysalis-ITS Luna SA, as specified in the [crypto/pkcs11modules/chrysalis] section.

Parameter	Default	Description
sharedLibrary	<*location/to/cryptoki*.so>	The absolute path to the PKCS#11 shared library corresponding to the HSM. The default value for Chrysalis (Luna) is: /usr/lunasa/lib/libCryptoki2.so
storageSlot	0	The HSM slot where the encryption keys (symmetric as well as asymmetric) are present.
accelSlot	0	The slot for internal use by RiskMinder.
sessionCount	20	The maximum number of sessions that can be established with the HSM device.

The following table lists the configuration parameters for nCipher netHSM, as specified in the [crypto/pkcs11modules/nfast] section.

Parameter	Default	Description
sharedLibrary	<*location/to/ccknfast*.so>	The absolute path to the PKCS#11 shared library corresponding to the HSM. The default value for nFast (nCipher netHSM) is: /opt/nfast/toolkits/pkcs11/libcknfast.so
storageSlot	1	The HSM slot where the encryption keys (symmetric as well as asymmetric) are present.
accelSlot	0	The slot for internal use by RiskMinder.
sessionCount	200	The maximum number of sessions that can be established with the HSM device.

Instance Settings

In a farm of servers, it is recommended that every instance of the server has its own unique identification. RiskMinder supports a parameter to set and identify every instance of the servers. This section enables you to configure these system-wide settings for unique instances. The following table lists the instance setting parameters in the [arcot/system] section.

Parameter	Default	Description
InstanceId	1	The parameter that can be used to identify any server instance. **Important!** You must provide unique values for every instance of the server. The server instance is also displayed in the transaction reports, making it easier to trace the server instance to the transaction.

Changing Server Startup Logging Parameters

If you want to change the logging parameters that you see when RiskMinder Server or Case Management Queuing Server starts up, then:

1. Navigate to the conf directory in ARCOT_HOME.
2. Open arcotcommon.ini in a text editor of your choice.
3. (**For RiskMinder Server**) Add the following section at the end of the file:

```
[arcot/riskfort/startup]
LogFile=
LogFileSize=10485760
BackupLogFileDir=
LogLevel=
LogTimeGMT=0
```

The following table explains these parameters.

Parameter	Default	Description
LogFile		The file path to the default directory and the file name of the log file. **Note:** This path is relative to ARCOT_HOME (<*install_location*>/arcot/).
LogFileSize	10485760	The maximum number of **bytes** the log file can contain. When a log file reaches this size, a new file is started and the old file is moved to the location specified for BackupLogFileDir.

Parameter	Default	Description
BackupLogFileDir		The location of the directory where backup log files are maintained, after the current file exceeds LogFileSize bytes. **Note:** This path is relative to ARCOT_HOME (<*install_location*>/arcot/).
LogLevel		The default logging level for the server, unless an override is specified. The possible values are: ■ 0: FATAL ■ 1: WARNING ■ 2: INFO ■ 3: DETAIL
LogTimeGMT	0	The parameter which indicates the time zone of the time stamp in the log files. The possible values are: ■ 0: Local Time ■ 1: GMT

1. (**For Case Management Queuing Server**) Add the following section at the end of the file:

   ```
   [arcot/riskfortcasemgmtserver/startup]
   LogFile=
   LogFileSize=10485760
   BackupLogFileDir=
   LogLevel=
   LogTimeGMT=0
   ```

   The table in the previous step explains these parameters.
2. Set the required values for the parameters that you want to change.
3. Save and close the file.
4. Restart RiskMinder Server.
5. Restart Case Management server.

Watchdog Settings

This section enables you to specify the configuration for the Watchdog process that monitors the RiskMinder Server instances on UNIX platforms. The following table lists the instance setting parameters in the [arcot/system] section.

Parameter	Default	Description
ServerStartsTimeout	25	The time period (in **minutes**) from the Server startup. If the Watchdog process brings up the Server for 5 times within the specified duration of ServerStartsTimeout (25 minutes), then the Server is not restarted again.
ServerStartsCount	5	The maximum count for restarting the Server. After this, the Server is not restarted again.
RestartSleepTime	5000	The sleep time (in **milliseconds**) after which the Watchdog restarts the Server.

riskfortdataupload.ini

RiskMinder uses Quova data to identify the geolocation of a user by using the IP address of the system from which the transaction originated. It then uses this data to evaluate Negative Country, Negative IP, and Zone Hopping rules.

RiskMinder is shipped with the *Arcot RiskFort Data Upload Tool* (arrfupload) to enable you to upload the geolocation data from Quova files to the RiskMinder database. The riskfortdataupload.ini file controls the behavior of the Arcot RiskFort Data Upload tool and is available at the following location:
`<install_location>/arcot/conf/`

The following table lists the configuration parameters in this file.

Parameter	Default	Description
Tables	Do Not Load	The tables that the user can work with. Possible values are: ■ GeoPoint ■ Anonymizer

Parameter	Default	Description
Load	0	The indicator whether to upload the data to the table or not. Possible values are: ■ 0: Do not load) ■ 1: (Load)
Swap	0	The indicator whether to swap the tables or not. Possible values are: ■ 0: (Do not swap) ■ 1: (Swap)
Filename	--	The name of the file from which the Quova data has to be loaded. **Important!** Mention the absolute path to the file, with the file name.

Note: If both, Load and Swap are set to 1, then first the table is loaded and then swapped.

udsserver.ini

The udsserver.ini file contains the parameters to set the User Data Service (UDS) log information. The following table provides information about the RiskMinder parameters that you configure:

The common log-level values that can be set in this file are:

- FATAL
- WARNING
- INFO
- DEBUG

Book: See *CA RiskMinder Administration Guide* for more information about the log levels.

Parameter	Default Value	Description
log4j.rootCategory	ERROR, debuglog	The root logger that resides at the top of the logger hierarchy. All children loggers inherit this value, if no value is specified.
log4j.logger.com.arcot.euds	INFO	The log level that must be used to write the UDS information.
log4j.logger.com.arcot.crypto.impl. SecureStoreUtil	INFO	The log level that must be used to write the logs, if you are using a hardware-based or software-based HSM.
log4j.logger.com.arcot.common.database	INFO	The log level that must be used to write the database information.
log4j.logger.com.arcot.common.cache	INFO	The log level that must be used to write the UDS cache information.
log4j.appender.debuglog	org.apache.log4j.RollingFileAppender	The name of the UDS log handle that specifies the mode in which the log file is opened and the offset pointer where the next operation will begin.

Parameter	Default Value	Description
log4j.appender.debuglog.File	${arcot.home} /logs/arcotuds.log	The log file name and the location where the UDS logs will be created. By default, the UDS log file name is arcotuds.log and is created in the following location: <*install_location*>/arcot/logs/
log4j.appender.debuglog.MaxFileSize	10MB	The maximum allowed file size of the log file.
log4j.appender.debuglog.MaxBackupIndex	100	The maximum number of backup files that can be created. When the number of backup files reaches this number, then the application starts to overwrite from the first log file.
log4j.appender.debuglog.layout	org.apache.log4j. PatternLayout	The output format, as specified by the ConversionPattern parameter.
log4j.appender.debuglog.Encoding	UTF-8	The encoding to use when writing the entries in the log file.
log4j.appender.debuglog.layout. ConversionPattern	%d{yyyy-MM-dd HH:mm:ss,SSS z} : [%t] : %-5p : %-5c{3} : %m%n	The format in which the UDS log file entries are written: ■ Time Stamp (%d{yyyy-MM-dd HH:mm:ss,SSS z} :) ■ Thread ID ([%t] :) ■ Log Level (or Severity) (%-5p :) ■ Logger Class (%-5c{3} :) ■ Message (%m%n) **Note:** This pattern is similar to the C language printf function.

Properties Files

RiskMinder primarily uses the properties files that are discussed in the following sections:

- riskfort.risk-evaluation.properties (see page 218)
- log4j.properties.risk-evaluation (see page 221)

These files are available at:
`<install_location>/arcot/sdk/java/properties/`

riskfort.risk-evaluation.properties

The riskfort.risk-evaluation.properties file provides the parameters for the RiskMinder Risk Evaluation Java SDK and Sample Application to read RiskMinder Server information. The following table lists the configuration parameters that are used in this file.

Parameter	Default	Description
HOST.1	localhost	IP address of RiskMinder Server.
PORT.1	7680	Port number where RiskMinder Server is listening to incoming requests.
CONNECTION_TIMEOUT	10000	Time in **milliseconds** before RiskMinder Server is considered unreachable.
CONNECTION_RETRIES	3	Maximum number of retries allowed with RiskMinder Server.
READ_TIMEOUT	30000	Maximum time in **milliseconds** allowed for a response from RiskMinder Server.
USE_CONNECTION_POOLING	1	Parameter for enabling or disabling connection pooling to RiskMinder Server: ■ 0: Disabled ■ 1: Enabled
MAX_ACTIVE	128	Maximum number of active connections (from the pool) allowed with RiskMinder Server. It controls the maximum number of connections that can be borrowed from the pool at one time. When negative, there is no limit on the number of objects that might be active at a time.

Parameter	Default	Description
TIME_BETWEEN_CONNECTION_EVICTION	900000 (15 minutes)	Time in **milliseconds** between consecutive runs of the Idle Connection Evictor thread. **Note:** If this parameter is set to -1, then connections are not evicted. **Important!** Ensure that TIME_BETWEEN_CONNECTION_EVICTION + IDLE_TIME_OF_CONNECTION is less than the connection timeout of your firewall (between SDK and RiskMinder Server.) This will ensure that no connection is abruptly dropped by the firewall because of idle time, which ensures smooth functioning of the system.
IDLE_TIME_OF_CONNECTION	1800000 (30 minutes)	Idle time (in **milliseconds**) after which a connection will be closed. **Note:** If this parameter is set to -1, then connections are not evicted.
WHEN_EXHAUSTED_ACTION	BLOCK	The SDK behavior when all connections are exhausted: ■ BLOCK: The SDK waits for a connection to be free. This is the default behavior. ■ FAIL: The transaction is considered as failed. ■ GROW: The SDK can increase the pool.

Parameter	Default	Description
TRANSPORT_TYPE	TCP	Default value for RiskMinder Server to start up is TCP. Set this parameter to SSL, if RiskMinder Native protocol is set to SSL. In other words, set this parameter to SSL, if you want to enable SSL-based secure communication between Administration Console and RiskMinder Server. **Note:** Restart RiskMinder Server if you change the value to SSL.
CA_CERT_FILE		Path for the CA certificate file of the server. The file *must* be in .PEM format. Provide the complete path for the file. For example: <*install_location*>/certs/ca.pem or <*install_location*>\\certs\\ca.pem **Note:** ■ Use CLIENT_P12_FILE for the client PKCS#12 file (which contains the Client key and the Certificate pair.) ■ Use CLIENT_P12_PASSWORD for the password of the specified PKCS#12 file.
LIFO	false	Indication whether or not the connection pool returns idle objects in Last-In-First-Out order. Set it to false to ensure that each connection is used in a round-robin manner and is not idle. For high-load deployments, the recommended value is false.
NUM_PRE_CREATE	32	Number of connections that must be created during the initialization of the pool.

Parameter	Default	Description
NUM_CONNECT_FAILURES_TO_TRIGGER_FAILOVER	2	Number of consecutive connection failures that will trigger the failover to another pool.
MAX_IDLE	-1	The maximum number of idle connections from the SDK to a given server instance allowed in the pool.
MAX_WAIT_TIME_MILLIS	3000	The maximum time (**in milliseconds**), a connection request will wait for a connection from the pool. **Note:** If this parameter is set to -1, the request will wait indefinitely.

log4j.properties.risk-evaluation

The log4j.properties.risk-evaluation file specifies the logging behavior of RiskMinder and its Risk Evaluation components. The following table provides information about parameters that you may need to change for Risk Evaluation.

Parameter	Default Value	Description
log4j.rootLogger	INFO, debuglog	Specify the log level that must be used to write the logs. The supported log levels are: ■ FATAL ■ WARNING ■ INFO ■ DEBUG **Note:** See *CA RiskMinder Administration Guide* for more information about the log levels.
log4j.logger.com.arcot	INFO	
log4j.logger.com.arcot.riskfortAPI	DEBUG	
log4j.appender.debuglog.File	arcot-riskfort-evaluaterisk.log	The name of the log file. Possible values for this parameter are: ■ riskfortsdk.log (for RiskMinder Java SDK) ■ arriskfortws.log (for RiskMinder Web Service)
log4j.appender.debuglog.MaxFileSize	1MB	The maximum allowed file size of the log file.

Parameter	Default Value	Description
log4j.appender.debuglog.MaxBackupIndex	3	The maximum number of backup files that can be created. When the number of backup files reaches this number, then the application starts to overwrite from the first log file.

Appendix C: Changing Hardware Security Module Information After the Installation

Note: Before proceeding with the configurations explained in this section, ensure that you have set up the HSM server and client, and generated the 3DES key in the HSM. Refer to "(Optional, Only If You are Using HSMs) Requirements for HSM" (see page 61) for more information.

As mentioned in "Hardware Security Module (HSM) Requirements" (see page 46), RiskMinder now supports Hardware Security Module (HSM) to secure your data. If you choose to encrypt the data by using HSM, then the data that is stored in the database is encrypted with the key that resides in the HSM.

By default, RiskMinder uses the software (**S/W**) mode to encrypt data. You can change the mode to hardware (**chrysalis** or **nfast**). You do so by using the [arcot/crypto/device] section in arcotcommon.ini. This file also provides separate sections for configuring the required HSM, which in the current release are:

- Luna HSM ([crypto/pkcs11modules/chrysalis])
- nCipher netHSM ([crypto/pkcs11modules/nfast])

Based on the HSM you are configuring, specify the sharedLibrary parameter in the corresponding section. After specifying the HSM information, re-create the securestore.enc file with the HSM key label, initialize the HSM, and then initialize RiskMinder to use the HSM key.

Changing HSM Configuration Post-Installation

During RiskMinder installation, the installer prompts you to specify HSM-related information. Perform the following steps if you want to change the HSM configuration later.

1. Navigate to the following location:
   <*install_location*>/arcot/conf/
2. Take a backup of the securestore.enc file.
3. Delete the existing securestore.enc file from <*install_location*>/arcot/conf/.
4. To change the data encryption mode from software (S/W) to hardware (chrysalis or nfast), and configure the HSM information that RiskMinder needs:
   a. Navigate to the following location:
      <*install_location*>/arcot/conf/
   b. Open arcotcommon.ini in a text editor.
   c. In the [arcot/crypto/device] section:
      - Set the HSMDevice parameter to chrysalis for Luna HSM.

      or

      - Set the HSMDevice parameter to nfast for nCipher netHSM.
   d. Depending on the HSM that you are configuring, set the sharedLibrary parameter to the location where the HSM library file is located:
      - The default location of the Luna HSM library is /usr/lunasa/lib/libCryptoki2.so.

      or

      - The default location of the nCipher netHSM is /opt/nfast/toolkits/pkcs11/libcknfast.so.

      Note: See "arcotcommon.ini" (see page 204) for more information about the other HSM configuration parameters available in this section.
   e. Save and close the arcotcommon.ini file.
5. Navigate to the following location, where the DBUtil tool is available:
   <*install_location*>/arcot/tools/platform/
6. Run the DBUtil tool with the following commands:

   Note: The database user (<*Database_Username*>) that you specify in the following commands is case-sensitive.

   a. dbutil -init <*HSM_Key_Label*>

      Note: The <*HSM_Key_Label*> corresponds to the 3DES key that resides in the HSM.

The preceding command creates the securestore.enc file with the specified key label. The generated file in stored in the *<install_location>*/arcot/ directory.

b. dbutil -i <*HSM_Module_Name*> <*HSM_Password*>

Note: The <*HSM_Module_Name*> is chrysalis for Luna HSM, and nfast for nCipher netHSM.

The preceding command initializes the HSM.

c. dbutil -pi <*DSN_Name*> <*Database_Password*> -h <*HSM_Password*> -d <*HSM_Module_Name*>

Note: <*DSN_NAME*> refers to the ODBC DSN that RiskMinder Server uses to connect to the RiskMinder database. <*Database_Password*> refers to the password used to connect to the database.

The preceding command initializes the RiskMinder Server data to be encrypted by using HSM.

d. dbutil -pi <*Database_Username*> <*Database_Password*> -h <*HSM_Password*> -d <*HSM_Module_Name*>

Note: <*Database_Username*> refers to the user name used to connect to the RiskMinder database. <*Database_Password*> refers to password used to connect to the database.

The preceding command initializes Administration Console and the User Data Service data to be encrypted by using HSM.

Appendix D: Database Reference

The RiskMinder database contains a number of tables, some of which grow with increased usage. Some tables grow in direct relation to the number of users, while others grow in direct relation to the usage of the product. Because of restricted disk space, as a database administrator managing RiskMinder deployments, you may not want these tables to grow indefinitely. In this case, you can use the information in this appendix to trim some tables to manage your disk space and improve the database performance.

Trim only the tables that capture transaction details, such as audit log information. Do *not* trim the tables that capture user information, which is necessary to assess the risk evaluation.

Note: It is recommended that you make appropriate adjustments to the databases based on the configuration and the need for reporting data. For example, deleting a large volume of data will adversely affect performance during the delete process. Depending on the size of the rollback segments, this may even cause the system to fail. It is also recommended that you archive older records and not delete them completely.

This appendix discusses the recommendations on database table replication, how to calculate the database size while you are planning to set up the database for RiskMinder, and lists all the tables used by RiskMinder along with some trimming recommendations:

RiskMinder Database Tables

This section briefly explains all the database tables:

Used by RiskMinder

The following table lists all RiskMinder database tables and their description.

Table Name	Description
ARQGEOANONYMIZER1	Stores the known IP addresses of the anonymizers that do not propagate the end-user IP addresses. This is the primary table. **Note:** While reloading data to this table, the RiskMinder Server refers to ARQGeoAnonymizer2.
ARQGEOANONYMIZER2	Stores the known IP addresses of the anonymizers that do not propagate the end-user IP addresses. This is the secondary table. **Note:** While reloading data to this table, the RiskMinder Server refers to ARQGeoAnonymizer1.
ARQGEOPOINT1	Stores the geo-location information for different ranges of IP addresses. This information is obtained from Quova. **Note:** While reloading data to this table, the RiskMinder Server refers to ARQGEOPOINT2.
ARQGEOPOINT2	Stores the geo-location information for different ranges of IP addresses. This information is obtained from Quova. **Note:** While reloading data to this table, the RiskMinder Server refers to ARQGEOPOINT1.
ARQUOVAVERSION	Tracks the files from Quova that were uploaded to ARQ* tables.
ARRF_CASE_TXN	Contains the Case-to-Transaction mapping and related details of the default Channel. If you define a specific Channel for your deployment, then another database table is created with the Channel name appended to the default table, for example, ARRF_CASE_TXN_<*channel_name*>.
ARRF_CMA	Contains the repeated transactions of the same combination of Cardholder-Merchant-Amount (CMA). **Note:** If the rule is not used, then the table is empty.

Table Name	Description
ARRF_IMA	Contains the repeated transactions of the same combination of IP-Merchant-Amount. **Note:** If the rule is not used, the table is empty.
ARRFADDONEXPOSEDPARAMS	Stores the parameter details used by the custom rules you deploy. This table also stores the information whether specific parameters can be modified by a custom rule during processing. **Note:** Consult CA Support before modifying any parameters.
ARRFADDONRULELISTDATA	Contains list data and corresponding dataset version. This is used by rules or rule fragments that use IN_LIST and IN_CATEGORY operators.
ARRFADDONRULEMAPPINGDATA	Contains mapping of the elements and the category to which it belongs to. This data is used by rules that use the IN_CATEGORY operator to store the DATA-to-Category mapping. For example, Merchant rules in a 3-D Secure deployment.
ARRFADDONRULETYPE	Stores the detailed configuration information for custom rules implemented for each organization in the system.
ARRFADVICECODE	Stores the list of available risk advices.
ARRFADVICECONFIG	Stores mapping of risk score ranges and corresponding advice. **Note:** Currently, this mapping is same for all the organizations.
ARRFBASECHANNELELEMENTS	Stores the mapping of all common elements and their configurations across channels.
ARRFBUCKETCONFIG	Stores the details of all categories used for signature matching by MFP and DeviceDNA. In other words, this table contains the master list of all classifications, and their details, such as attributes and relative weight that is used in the DeviceDNA algorithm.
ARRFBUCKETELEMENTCONFIG	Stores the configuration details for all elements in all categories used for signature matching by DeviceDNA. In addition, this table contains the classification for these elements.

Table Name	Description
ARRFCASEAUDITLOG	Stores the case details and other case-related activities that are logged.
ARRFCASEQUEUES	Stores the definitions of each case queue.
ARRFCASES	Stores the details of all the open cases in the system, irrespective of the queue they belong to.
ARRFCHANNEL	Stores the basic definition (such as, case transaction table name and audit log table name) of all Channels that exist in the system.
ARRFCHANNELDETAILCATEGORY	Stores the details on various categories that GUI display elements belong to, for each channel.
ARRFCHANNELELEMENTS	Stores the details of all Channel elements.
ARRFCHANNELMSGPROPERTIES	Stores channel-specific localization information, such as channel display names and keys. **Note:** Localization is not supported in the current release.
ARRFCHANNELTXNTYPE	Stores the mapping details of all transactions supported for each channel in the system.
ARRFCHANNELTXNTYPEELEMENTS	Stores the channel-wise details of all possible element types that can come as a part of the request.In other words, this table stores the mapping of channel elements to action.
ARRFCLIENTCERTSANDKEYS	Stores SSL keys and certificates required for communicating with a de-tokenization service. **Note:** Currently, this table is applicable only for TransFort-RiskMinder integration deployments.
ARRFCLIENTSSLROOTCAS	Stores the client trust stores and the corresponding root CA certificates for two-way SSL authentication.
ARRFCONFIGURATION	Stores global- and organization-level miscellaneous RiskMinder configurations. This includes the information related to case details and other case-related activities that are logged.
ARRFCOUNTRY	Stores the list of all countries and their ISO codes.
ARRFCOUNTRYLIST	Stores the list of all countries as listed in Quova data.

Table Name	Description
ARRFCURRCONVRATES	Stores the list of all supported currencies and their corresponding conversion rates.
ARRFCURRENCY	Stores the details of all currencies, their ISO codes, and exponents for each.
ARRFCURRENTCMSCHEDULE	Stores the case schedules created by Case Management Queuing Server.
ARRFCURRENTORGCONFIG	Stores the current configuration for all organizations in the system.
ARRFDATAVERSIONMAPPING	Stores all configured RiskMinder configuration information. The information in this table contains release information, and therefore can contain multiple entries per configuration.
ARRFDBERRORCODES	Contains all database error codes that indicate a possible communication failure. **Note:** Consult CA Support before editing this table.
ARRFDEVICECONTEXT	Stores the context information (such as device status, timestamp of the transaction, and the requested action) for each incoming transaction from a user device. **Note:** This information is used for Device Velocity checks.
ARRFDEVICEINFO	Stores detailed information for all devices used for user transactions.
ARRFDEVICEINFOHIST	Stores the history of all user devices registered with the system.
ARRFDEVICETYPE	Stores the master list of all supported desktop and hand-held devices.
ARRFDEVUSERASSO	Stores all information related to user-device mapping.
ARRFDEVUSERASSO_ARCHIVE	Stores all archived information related to user-device mapping.
ARRFDISPLAYNAMES	Stores all variable strings (for DISPLAYNAMEKEY) that are used by Administration Console labels (ARRFMESSAGES).

Table Name	Description
ARRFELEMENTSSUPPORTEDVALUES	Stores the Case Management layout details for viewing transaction details.
ARRFELEMOPREGIONMAP	Stores the detailed mapping for all elements-to-operations that you can use while using the Rules Builder to create custom rules. In other words, this table stores the metadata used for organizing the Rule Builder screen.
ARRFEXCEPTIONUSER	Stores the list of users marked as Exception Users.
ARRFEXCPUSERHIST	Stores the history of all users who were marked as exception users.
ARRFINSTANCEAUDITLOG	Stores all details related to all instances configured in the system along with all activities (such as restart, update, refresh, and shutdown) that were performed on the instance. In other words, this table stores the audit trail of all management activities for each instance in the system.
ARRFINSTANCES	Stores the details of all server instances configured in the system. These instances can either be RiskMinder Server instances or Case Management Queuing Server instances.
ARRFIPCONTEXT	Stores the IP context that is used by the IP velocity rule. **Note:** This table is for future use.
ARRFLIBRARYTOTYPEMAPPING	Stores the mapping of all supported custom rule types with the corresponding library name. **Note:** This table is for future use.
ARRFLOCALE	Stores information related to all supported locales.
ARRFMESSAGES	Stores the Response and Reason Codes messages.
ARRFNEGATIVECOUNTRYLIST	Stores the list of all negative countries.
ARRFOPERATORS	Stores the list of all operators (used for creating rules by using Rule Builder) supported by RiskMinder.
ARRFORGCHANNEL	Stores the list of all supported Channels for each organization.

Table Name	Description
ARRFORGQUEUES	Stores the list and basic details of all queues that belong to an organization and Channel.
ARRFOTHERELEMENTS	Stores detailed information for all non-channel elements (such as system time) using which you can write custom rules. In other words, this table stores the list of elements that are not passed during a transaction, but are used or displayed in the Rule Builder screen.
ARRFPROTOCOLREGISTRY	Stores configuration of each listener port of RiskMinder Server.
ARRFQUEUEADMIN	Stores the Queue-to-Administrator mapping details.
ARRFRULEDEPENDENCY	Stores the details of what other rules a rule is dependent on.
ARRFSERVERS	Stores the mapping of available RiskMinder Server instances.
ARRFSITES	Stores site details for each de-tokenization service. **Note:** Currently, this table is applicable only for TransFort-RiskMinder integration deployments. This table will be deprecated in a future release.
ARRFSYSAUDITLOG	Stores all details related to all transactions (risk evaluation and other activities) that are logged. If you configure additional Channels for your deployment, then corresponding tables are created and named with the Channel name appended to the default table name, for example, ARRFSYSAUDITLOG_<*channel_name*>.
ARRFSYSORGCONFIG	Stores all versions of configurations available for all organizations in the system. **Note:** This table stores both history and the changes that are made by the administrator.
ARRFSYSPARAMSCONFIG	Contains detailed information about all RiskMinder system parameters that are configurable by using Administration Console. **Note:** This table stores both history and the changes that are made by the administrator.

Table Name	Description
ARRFSYSRULEEXECCONFIG	Stores the configuration information for all rules. This information includes version and configuration for each rule. **Note:** This table stores both history and the changes that are made by the administrator.
ARRFSYSTERMRULESCORECONFIG	Stores configuration information for each rule and the corresponding result that impacts the risk score.
ARRFTRUSTEDIPLIST	Stores the information for all trusted aggregators, IP addresses, and ranges.
ARRFTXNTYPE	Stores the master list of all transaction types supported in the system.
ARRFUAOSLIST	Stores the master list of all User-Agent OS strings-to-actual-Operating System-and-Version mappings. This information is used for logical upgrades for Windows.
ARRFUNTRUSTEDIPLIST	Stores the details of all negative IP addresses.
ARRFUNTRUSTEDIPLIST_ ARCHIVE	Stores the archived information for the ARRFUNTRUSTEDIPLIST table. In other words, this table serves as an archive of details related to all deleted negative IP addresses.
ARRFUNTRUSTEDIPTYPE	Stores the mapping for all supported negative IP types.
ARRFUPLOADAUDITLOG	Stores the details of the operations performed on the GeoPoint and GeoAnonymizer tables.
ARRFUSERCONTEXT	Stores the context information (such as user status, timestamp of the transaction, and the requested action) for each incoming transaction from a user. **Note:** This information is used for User Velocity checks.
ARRFUSERCONTEXT_ARCHIVE	Stores the archived information for the ARRFUSERCONTEXT table. In other words, this table serves as an archive for user context information for deleted users.

Used by Administration Console

The following table lists all database tables that are used by Administration Console.

Table Name	Description
ARADMINAUDITTRAIL	Stores administrator activity audit.
ARADMINAUTHTOKEN	Stores the tokens that Administration Console uses for pluggable authentication. Every time you log in to Administration Console by using your password, a token is internally generated after password match and stored in this table.
ARADMINBASICAUTHPWDHISTORY	Stores the last *n* occurrences of password of all administrators in all organizations that use Basic Authentication (for administrators) to log in to Administration Console. This information is stored to prevent password reuse.
ARADMINBASICAUTHUSER	Stores the basic authentication credentials of all administrators in all organizations that use Basic Authentication (for administrators) to log in to Administration Console.
ARADMINCONFIG	Stores Administration Console configurations.
ARADMINCUSTOMROLE	Stores the configurations for all custom-defined roles.
ARADMINMANAGEROLE	Stores the list of roles that a specified role can manage.
ARADMINMAP	Stores the information of the RiskMinder Server instance, which is entered as a key-value pair.
ARADMINPAFCONFIG	Stores the authentication configurations for all administrators in all organizations in the system.
ARADMINPREDEFINEDROLE	Stores the role information for all supported administrators.
ARADMINPWDPOLICY	Stores the details of password policies for all administrators in all organizations.
ARADMINROLEPRIVILEGE	Stores the mapping of all administrative actions (or tasks) supported by Administration Console, the scope of each task, and which role can perform the task.

Table Name	Description
ARADMINSCOPE	Stores the list of organizations over which each administrator has control (scope).
ARADMINSCOPEALL	Stores the list of all administrators who have control (scope) over *all* the existing organizations in the system.
ARADMINSUPPORTEDAUTHMECH	Stores the information about all supported authentication mechanisms to log in to Administration Console.
ARADMINSUPPORTEDTIMEZONE	Stores the list of all available time zones that do not change after you install the Advanced Authentication product. **Note:** This is an internal table.
ARADMINTURNEDOFFPRIVILEGE	Stores the list of all privileges that are not available for the given custom role.
ARADMINTXID	Stores information required to generate a unique ID for each transaction.
ARADMINUITAB	Stores information about the tabs that are available and the order in which they are available in Administration Console.
ARADMINUITASK	Stores information about all the tasks that are available and the order in which they are available through Administration Console.
ARADMINUITASKATTRIBUTES	Stores details of the tasks that are displayed, when the first-level and the second-level tabs in Administration Console are clicked. These tasks are referred to as landing pages.
ARADMINUITASKCONTAINER	Stores information related to available *task containers*. A task container can either be a second-level tab ID or the task group in Administration Console.
ARADMINUSER	Stores detailed information (such as organization to which they belong, current status, timezone, locale, last login time) of all existing administrators.
ARADMINUSER_ARCHIVE	Stores information related to all deleted users.
ARADMINWIZARDTASK	Stores information about all the tasks that can be performed by using the Bootstrap Wizard.

Table Name	Description
ARCMNBULKOPERATION	Stores information related to all supported bulk operations that include uploading users and uploading user accounts.
ARCMNBULKOPERATIONATTRIBUTE	Stores attributes for all bulk operations in the ARCMNBULKOPERATION table.
ARCMNBULKREQUEST	Stores details (such as organization name, Request ID, status of the request, data uploaded, and operation) for each bulk-upload request.
ARCMNBULKTASKPARAM	Stores the name and the value of each attribute for each task supported in the system.
ARCMNBULKUPLOADTASK	Stores the status of each task for every bulk-upload request.
ARCMNCACHEREFRESH	Stores cache-related housekeeping information that indicates whether Administration Console needs to be refreshed or not.
ARCMNCONFIG	Stores common Administration Console configuration information. Some of these include whether Bootstrap is complete, whether the cache refresh is automatic or manual, whether attribute encryption is enabled, and whether the bulk upload feature is enabled or not.
ARCMNDBERRORCODES	Stores vendor-specific database error codes and SQL state values that signify whether the database is down or non-responsive. This information is used by the system to decide if database should be failed over, in case a backup database is configured.
ARCMNMAPDATATYPE	Stores Advanced Authentication product-specific information that Administration Console uses for rendering the console pages.
ARPFCMNCACHEREFRESHEVENT	Stores details of all cache refresh events for all instances in the system.
ARPFCMNCACHEREFRESHSCOPE	Stores information about all organizations that will be affected if a server cache refresh event occurs.

Table Name	Description
ARPFCMNCACHEREFRESHSTATUS	Stores the status of each cache refresh event for every instance for which it was triggered.
ARPFCMNINSTANCE	Stores detailed information for all RiskMinder Server instances configured in the system. This also includes the last time the instance was refreshed.
ARPFCMNORGCONFIGDATA	Stores configuration details for each organization. This includes global configurations that can be, typically, overridden at the organization-level.
ARPFCMNORGCONFIGSTATE	Stores the status of each assigned configuration from the ARPFCMNORGCONFIGDATA table.
ARPFCMNPRIVILEGEMAPPING	Stores the details of each privilege available through Administration Console.
ARSEQUENCETABLE	Used only by MS SQL Server, this table simulates sequences using stored procedures.
ARREPORTTABLES	Contains the metadata of other Administration Console and UDS tables.

Used by User Data Service (UDS)

The following table explains the database tables that are used by UDS.

Table Name	Description
ARCMNKEY	Stores all global-level and organization-level key labels.
ARUDSACCOUNTTYPE	Stores details of all account types that are configured in the system.
ARUDSATTRMAP	Stores the configuration details that describe the field names of custom attributes for accounts, specific to each organization.
ARUDSAUTHSESSION	Stores authentication session details for currently active sessions. If this table is not replicated, then active authentication sessions can be lost.

Table Name	Description
ARUDSCALLOUT	Stores user-specific Callout configurations. These Callouts are called, if configured, for specific events, such as user creation and update.
ARUDSCALLOUTINTERNAL	Stores configuration information (SDK method to be invoked), for Callouts when a delete event with cascade effect is triggered or enabled.
ARUDSCALLOUTINTERNALPARAMS	Stores details, such as parameters and types specific to internal Callouts.
ARUDSCALLOUTPARAM	Stores details, such as parameters and types specific to external Callouts.
ARUDSCONFIG	Stores UDS configuration parameters and their values.
ARUDSCONFIGAUDITLOG	Stores audit log information for the User Data Source (UDS) operations and their return status.
ARUDSCONTACTTYPE	Stores additional contact information (such as secondary email and telephone number) that can be configured at the organization or global level.
ARUDSCUSTOMATTREXT	Stores additional user account custom attributes. By default, up to 10 user account custom attributes are stored in the ARUDSUSERACCOUNT table. Any additional attributes (after the first 10) are stored in this table.
ARUDSCUSTOMATTREXT_ARCHIVE	Stores archived information related to user account custom attributes when a user account is deleted.
ARUDSLDAPREPOSITORYCONFIG	Stores LDAP Repository configurations, such as LDAP host and port details.
ARUDSORGANIZATION	Stores organization definitions, their attributes and repository connectivity details.
ARUDSORGANIZATIONAUDITLOG	Stores detailed organization-specific UDS audit logging information.

Table Name	Description
ARUDSORGREPOATTRIBUTES	Stores organization-specific repository mapping information. For example, if you are using LDAP as the user repository, then a RiskMinder database attribute (say FNAME) might be mapped to a corresponding LDAP attribute (say GIVENNAME).
ARUDSORGSECUREATTRIBUTES	Stores organization-specific attributes that need to be encrypted, such as Personal Identification Information (PII) fields. **Note:** You can also configure these attributes by using Administration Console.
ARUDSREPOCLONESTATUS	Stores status of temporary cloning of user information from an external repository (such as LDAP) to the ARUDSREPOSITORYUSER table.
ARUDSREPOSITORYTYPES	Stores definitions of all repositories supported by UDS.
ARUDSREPOSITORYUSER	Temporarily stores user information from an external repository (such as LDAP) to increase performance. This is typically done when user data for a large number of users must be retrieved from the external repository.
ARUDSRESOURCESCOPE	Stores resource-to-organization mapping. In other words, this table specifies which resource is applicable for which organizations. For example, specific account types might be applicable only for specific organizations.
ARUDSRESOURCESCOPEALL	Stores resource-to-organization mapping. However, it is different from the ARUDSRESOURCESCOPE table, because it specifies which resource is applicable for *all* organizations.
ARUDSSECUREATTRIBUTES	Stores information related to all attributes (such as fields that store PII) that need to be encrypted. **Note:** You can also configure these attributes by using Administration Console.

Table Name	Description
ARUDSUSER	Stores user details and attributes of all users who belong to the organization.
ARUDSUSER_ARCHIVE	Stores user details for all user accounts that have been deleted from the system.
ARUDSUSERACCOUNT	Stores user account information for specific users.
ARUDSUSERACCOUNT_ARCHIVE	Stores user account information for all user accounts that have been deleted from the system.
ARUDSUSERATTRIBUTE	Stores all user attribute definitions. This table is expected to change rarely, only when new user attributes are added by individual products.
ARUDSUSERAUDITLOG	Stores user operation-specific detailed audit logging information.
ARUDSUSERCONTACT	Stores secondary contact information (such as email or telephone numbers) for users.
ARUDSUSERCONTACT_ARCHIVE	Stores secondary contact information (such as email or telephone numbers) for the user accounts that have been deleted from the system.

Database Sizing Calculations

This section helps database administrators calculate the approximate size of the database for RiskMinder.

Denotations Used in Sample Calculations

The following denotations are used in the sample calculation:

- Number of users = *N*
- Average number of devices per user = *O*
- Average number of user-device associations = *A*
- Average number of transactions per day = *T*
- Number of entries in the Quova Data Feed = *Q*
- Computation time frame (in days) = *D*

Value Assumptions Made

The following assumptions have been made for calculation purposes:

- Number of users (**N**) = 1,000,000 (one million)
- Average number of devices per user (**O**) = 2
- Average number of user-device associations (**A**) = 2
- Average number of transactions per day (**T**) = 24,000
- Number of entries in the Quova Data Feed (**Q**) = 10,000,000 (ten million)
- Computation time frames (**D**) = 90 days

Sample Calculations Based on Assumptions Made

Considering the figures that are assumed in the preceding section, the final requirement should be as shown here:

- Based on **total number of users**, the database size = (10 * *N*) KB

  In this calculation, the value 10 KB per user has been arrived at as follows:

  - **ARRFUSERCONTEXT:** 3 KB per record
  - **ARUDSUSER:** 3.5 KB per record
  - **ARUDSAUDITLOG:** 3 KB per record
- Based on **total number of devices**, the database size = (6 * *O* * *N*) KB

  In this calculation, the value 6 KB per user has been arrived at as follows:

  - **ARRFDEVICECONTEXT:** 2 KB per record
  - **ARRFDEVICEINFO:** 4 KB per record

  In this calculation, based on the assumption that is made in the previous section:

  - **O**: 2
- Based on **total number of user-device associations**, the database size = (5 * *A* * *N*) KB

  In this calculation, the value 5 KB per user has been arrived at as follows:

  - **DEVICEUSERASSOCIATION:** 1 KB per record
  - **DEVICEINFO:** 4 KB per record

  In this calculation, based on the assumption that is made in the previous section:

  - **A**: 2
- Based on **daily activity,** the database size = (*T* * *D* * 20) KB
- Based on the **size of Quova Data Feed,** the database size = (*Q* * 2) KB

Database Tables Replication Advice

This section provides information about how frequently the tables must be replicated between the primary and the backup databases. It covers the following topics:

Tables That Need Real-Time Synchronization

The following table lists the database tables that need real-time synchronization between the primary and the backup databases. This category mainly includes the tables that contain user-related information and this data is required for authentication. Therefore, perform real-time synchronization of these tables.

Component	Table
Administration Console	ARADMINAUDITTRAIL
	ARADMINBASICAUTHUSER
	ARADMINSCOPE
	ARADMINSCOPEALL
	ARADMINUSER
	ARSEQUENCETABLE
	ARADMINTXID
	ARCMNKEY
	ARUDSORGANIZATION
	ARUDSORGREPOATTRIBUTES
	ARUDSORGSECUREATTRIBUTES
	ARUDSLDAPREPOSITORYCONFIG
	ARUDSACCOUNTTYPE
	ARUDSRESOURCESCOPE
	ARUDSRESOURCESCOPEALL
	ARUDSATTRMAP
	ARUDSCONTACTTYPE

Component	Table
UDS	ARUDSUSER
	ARUDSUSERACCOUNT
	ARUDSCUSTOMATTREXT
	ARUDSAUTHSESSION
	ARUDSUSERCONTACT
	ARUDSREPOSITORYUSER
	ARPFCMNINSTANCE
RiskMinder	ARRF_CMA
	ARRF_IMA
	ARRF_CASE_TXN
	ARRFCURRENTCMSCHEDULE
	ARRFADDONRULELISTDATA
	ARRFADDONRULEMAPPINGDATA
	ARRFCASEAUDITLOG
	ARRFCLIENTSSLROOTCAS
	ARRFCURRENTORGCONFIG
	ARRFDATAVERSIONMAPPING
	ARRFDEVICECONTEXT
	ARRFDEVICEINFO
	ARRFDEVUSERASSO
	ARRFEXCEPTIONUSER
	ARRFINSTANCEAUDITLOG
	ARRFINSTANCES
	ARRFIPCONTEXT
	ARRFNEGATIVECOUNTRYLIST
	ARRFSYSPARAMSCONFIG
	ARUDSAUDITLOG
	ARRFSYSAUDITLOG
	ARRFSYSORGCONFIG

Component	Table
RiskMinder	ARRFSYSRULEEXECCONFIG
	ARRFSYSTERMRULESCORECONFIG
	ARRFTRUSTEDIPLIST
	ARRFUNTRUSTEDIPLIST
	ARRFUSERCONTEXT
	ARRFORGQUEUES
	ARRFQUEUEADMIN
	ARRFUPLOADAUDITLOG
	ARRFCASEQUEUES

Tables That Need Periodic Synchronization

The following table lists the database tables that need periodic synchronization between the primary and backup databases. These database tables are synchronized when there is any change in the configurations.

Component	Table
Administration Console	ARADMINCONFIG
	ARADMINCUSTOMROLE
	ARADMINMAP
	ARADMINPAFCONFIG
	ARADMINPWDPOLICY
	ARADMINBASICAUTHPWDHISTORY
Administration Console	ARADMINTURNEDOFFPRIVILEGE
	ARADMINCACHEREFRESH
	ARADMINAUDITTRAIL
	ARADMINUSER_ARCHIVE
	ARADMINMANAGEROLE
	ARADMINROLEPRIVILEGE
	ARPFCMNORGCONFIGDATA
	ARPFCMNORGCONFIGSTATE
	ARPFCMNCACHEREFRESHSTATUS

	ARPFCMNCACHEREFRESHEVENT
	ARPFCMNCACHEREFRESHSCOPE
UDS	ARUDSUSERAUDITLOG
	ARUDSORGANIZATIONAUDITLOG
	ARUDSCONFIGAUDITLOG
	ARUDSCONFIG
	ARUDSREPOSITORYTYPES
	ARUDSUSERATTRIBUTE
	ARUDSUSERACCOUNT_ARCHIVE
	ARUDSCUSTOMATTREXT_ARCHIVE
	ARUDSUSER_ARCHIVE
	ARUDSUSERCONTACT_ARCHIVE
	ARCMNCONFIG
	ARUDSREPOCLONESTATUS
	ARUDSCALLOUTINTERNAL
	ARUDSCALLOUTINTERNALPARAMS
	ARUDSCALLOUT
	ARUDSCALLOUTPARAM
UDS	ARCMNBULKTASKPARAM
	ARCMNBULKUPLOADTASK
	ARCMNBULKREQUEST
	ARCMNBULKOPERATIONATTRIBUTE
	ARCMNBULKOPERATION
	ARRFCHANNEL
	ARRFCHANNELDETAILCATEGORY
	ARRFCHANNELELEMENTS
	ARUDSUSERATTRIBUTE
	ARQGEOANONYMIZER1

RiskMinder	ARQGEOANONYMIZER2
	ARQGEOPOINT1
	ARQGEOPOINT2
	ARQUOVAVERSION
	ARRFADDONRULETYPE
	ARRFADVICECONFIG
	ARRFBASECHANNELELEMENTS
	ARRFBUCKETELEMENTCONFIG
	ARRFBUCKETCONFIG
	ARRFCONFIGURATION
	ARRFCOUNTRY
	ARRFCOUNTRYLIST
	ARRFCHANNELMSGPROPERTIES
	ARRFCHANNELTXNTYPE
	ARRFCHANNELTXNTYPEELEMENTS
	ARRFCLIENTCERTSANDKEYS
	ARRFCONFIGURATION
RiskMinder	ARRFCURRCONVRATES
	ARRFDEVICEINFOHIST
	ARRFELEMOPREGIONMAP
	ARRFELEMENTSSUPPORTEDVALUES
	ARRFEXCPUSERHIST
	ARRFLIBRARYTOTYPEMAPPING
	ARRFOPERATORS
	ARRFOTHERELEMENTS
	ARRFORGCHANNEL
	ARRFPROTOCOLREGISTRY
	ARRFSERVERS
	ARRFSITES
	ARRFTXNTYPE
	ARRFUNTRUSTEDIPTYPE

	ARRFUSERCONTEXT_ARCHIVE

Tables That Do Not Need Synchronization

The following table lists the database tables that do not need any synchronization between the primary and backup databases.

Component	Table
Administration Console	ARADMINAUTHTOKEN
	ARCMNDBERRORCODES
	ARADMINPREDEFINEDROLE
	ARADMINSUPPORTEDAUTHMECH
Administration Console	ARADMINUITAB
	ARADMINUITASK
	ARADMINUITASKATTRIBUTES
	ARADMINUITASKCONTAINER
	ARADMINWIZARDTASK
	ARREPORTTABLES
	ARCMNMAPDATATYPE
	ARCMNCACHEREFRESH
	ARCMNMAPDATATYPE
	ARPFCMNPRIVILEGEMAPPING
	ARADMINSUPPORTEDTIMEZONE
UDS	ARUDSSECUREATTRIBUTES
RiskMinder	ARRFADVICECODE
	ARRFADDONEXPOSEDPARAMS
	ARRFCOUNTRYLIST
	ARRFCURRENCY
	ARRFDBERRORCODES
	ARRFDISPLAYNAMES

Component	Table
	ARRFLOCALE
	ARRFMESSAGES

Database Tables Archival Recommendations

This section walks you through the recommendations for:

- Tables that Grow Rapidly (see page 250)
- Tables that Grow Moderately (see page 251)

Important! Trim only the tables that capture transaction details, such as audit log information. Do *not* trim tables that capture user information, which is necessary to perform risk evaluation.

Tables that Grow Rapidly

The following table grow rapidly with each transaction that is performed. Ensure that these tables are archived or purged according to the archival policy of your organization:

- Tables that store **audit data**, such as:
  - ARADMINAUDITLOG
  - ARADMINAUDITTRAIL
  - ARRFINSTANCEAUDITLOG
  - ARRFUPLOADAUDITLOG
  - ARUDSAUDITLOG
- Tables that store **transaction data**, such as:
  - ARRFCASEAUDITLOG
  - ARRFSYSAUDITLOG
  - ARRFSYSAUDITLOG_<*channel*>
  - ARRF_CASE_TXN
  - ARRF_CASE_TXN_<*channel*>
  - ARRFUSERCONTEXT
- Tables that store **reports data** and **device data**, such as:
  - ARREPORTS
  - ARRFDEVICECONTEXT
  - ARRFDEVICEINFO
  - ARRFDEVUSERASSO
  - ARRFUSERCONTEXT
  - ARRF_IMA
  - ARRF_CMA
- Tables that store **configuration data**, such as:
  - ARRFCURRENTCMSCHEDULE
  - ARRFADVICECONFIG
  - ARRFCURRENTORGCONFIG
  - ARRFSYSORGCONFIG

When you archive data in these categories of rapidly growing tables, the following procedure is recommended:

1. Archive from the backup database.This will not affect transactions, but only reports.
2. Clean up the backup database.

3. Fail over the servers to use the backup database.
4. Clean up the primary database.
5. Revert to the primary database.

Tables that Grow Moderately

The following tables grow moderately, depending on how the Case Management feature is used. Therefore, these tables can be archived or purged at a lower frequency according to the archival policy of your organization:

- ARRFCASES
- ARUDSUSER

Note: Each entry in ARUDSUSER represents an enrolled user. User record enters in to this table through the User Management Web service. However, in some cases, you can choose to archive user data in the ARUDSUSER table. For example, you may want to archive information for users who have not accessed the application for a specified duration. In such cases, treat the returning user as a new user and provide risk scores consistent with that classification.
If your organization is interested in such optimizations, then it is recommended that you work with the CA Support team for the same.

Database Connection Tuning Parameters

The parameters that you can use to tune the connection between RiskMinder Server and the database are configured by using the Instance Management page in Administration Console. To access this console page, you must be logged in as Master Administrator (MA). The following table lists the common parameters that you can use to tune the connection between RiskMinder Server and the database.

Field	Description
Minimum Connections	The minimum number of connections to initially create between the RiskMinder Server and the database.
Maximum Connections	The maximum number of connections that can be created between the RiskMinder Server and the database. **Note:** Set this value according to the maximum number of connections that the database supports. This parameter overrides the MaxConnections parameter. See your database vendor documentation for more information.
Increment Connections By	The number of connections that will be added to the existing connections, when the need arises. The total number of connections cannot exceed the maximum number of connections.

Field	Description
Monitor Thread Sleep Time (in Seconds)	The amount of time the monitoring thread sleeps between heartbeat checks on all the databases.
Monitor Thread Sleep Time in Fault Conditions (in Seconds)	The interval at which the database monitor thread checks the health of the connection pool in case of faulty database connections.
Log Query Details	Enables you to log all the database queries.
Monitor Database Connectivity	The option to enable checking of the pools proactively in the database monitor thread.
Auto-Revert to Primary	Enables the server to switch from the backup to primary database when the primary database becomes functional.

Note: See chapter, "Managing RiskMinder Server Instances" in the *CA RiskMinder Administration Guide* for detailed information about configuring the database parameters.

Appendix E: Configuring CA RiskMinder for Oracle RAC

Perform the steps in this section only if you want to use Oracle RAC with RiskMinder 3.1.01.

This section contains the following topics:

Updating the arcot-db-config-for-common-2.0.sql Script

You run database scripts as a post-installation task in the RiskMinder installation procedure. The arcot-db-config-for-common-2.0.sql script is one of the database scripts that you run. Before you run this script, modify it for Oracle RAC.

Follow these steps:

1. To determine the Oracle RAC shared datafile path, log in to the database and run the following command:

   ```
   SELECT file_name, tablespace_name FROM dba_data_files
   ```

   The following is sample output of this command:

   ```
   +DATA/qadb/datafile/users.259.797224649      USERS
   +DATA/qadb/datafile/undotbs1.258.797224649   UNDOTBS1
   +DATA/qadb/datafile/sysaux.257.797224647     SYSAUX
   ```

2. Open the arcot-db-config-for-common-2.0.sql file. This file is in the install_location/arcot/dbscripts/oracle/ directory.

3. Search for the following line in the file:

   ```
   filename varchar2(50) := 'tabspace_arreports_'|| to_char(current_timestamp,
   'YYYY-MM-DD-HH24-MI-SS') || '.dat';
   ```

4. Replace that line with the following line:

   ```
   filename varchar2(100) :=
   '+shared_location/service_name/datafile/tabspace_arreports_'||
   to_char(current_timestamp, 'YYYY-MM-DD-HH24-MI-SS') || '.dat';
   ```

   In the new line:

   - Replace shared_location with the shared datafile path that you determined by running the command given in the first step.
   - Replace service_name with the service name of the Oracle RAC installation.

   The following is a sample line:

   ```
   filename varchar2(100) := '+DATA/forwardinc/datafile/tabspace_arreports_'||
   to_char(current_timestamp, 'YYYY-MM-DD-HH24-MI-SS') || '.dat';
   ```

5. Save and close the script file, and then run it.

Updating the arcotcommon.ini File

The arcotcommon.ini file contains the parameters for database and instance settings. When you run the installer, database configuration data items that you enter on the installer screens are stored in this file. The JDBC URL of the database is one such data item. If you are using Oracle RAC, specify the JDBC URL in the format supported by Oracle RAC.

Follow these steps:

1. Open the arcotcommon.ini file in a text editor. This file is in the install_location/arcot/conf/ directory.
2. Specify a value for the URL parameter in the [arcot/db/primarydb] section and, if required, in the [arcot/db/backupdb] section of the INI file. Enter the URL in the following format:

   ```
   URL.1=jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=host_name)(PORT=1521)))(CONNECT_DATA=(SERVICE_NAME=service_name)(SERVER=DEDICATED)))
   ```

   For example:

   ```
   URL.1=jdbc:oracle:thin:@(DESCRIPTION=(ADDRESS_LIST=(ADDRESS=(PROTOCOL=TCP)(HOST=172.30.250.18)(PORT=1521)))(CONNECT_DATA=(SERVICE_NAME=forwardinc)(SERVER=DEDICATED)))
   ```

   Note: If Oracle RAC is client configured, then include all the nodes in this format.
3. If the database user that you specified while running the AuthMinder installer is different from the database user in Oracle RAC, then:
   a. Change the database user credentials in the arcotcommon.ini file.
   b. Use DBUtil to change the database user credentials in the securestore.enc file. DBUtil is available in the ARCOT_HOME/tools/*<platform_name>* directory. Instructions on using DBUtil are given in Preparing for the Upgrade to 3.1.01 (see page 159).

Updating the odbc.ini File

The odbc.ini file contains connection parameters. For Oracle RAC, you must specify values pertaining to the Oracle RAC installation in the odbc.ini file.

Follow these steps:

1. Create a *.ora file on the system on which you have installed AuthMinder. For example, /var/opt/tns.ora.
2. Enter the following lines in the file:

```
section_name =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = host_name_or_IP_address)(PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = service_name)
    )
  )
```

   For example:

```
fwdincrac =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = 172.30.250.18)(PORT = 1521))
    )
    (CONNECT_DATA =
      (SERVICE_NAME = forwardinc)
    )
  )
```

   Note: If Oracle RAC is client configured, then include all the nodes in this format.
3. Save the file.
4. Open the *ARCOT_HOME*/odbc32v60wf/odbc.ini file in a text editor.
5. For the required DSN sections, comment out the lines containing the following parameters:
   - HostName
   - PortNumber
   - SID

   For example:

```
#HostName=172.30.251.251
#PortNumber=1521
#SID=an
```

6. Add the following parameters:

```
TNSNamesFile=ARCOT_HOME/ora_file_name
ServerName=section_name
```

For example:

```
TNSNamesFile=/var/opt/tns.ora
ServerName=fwdincrac
```

7. Save and close the file.

Appendix F: Default Port Numbers and URLs

This appendix lists the default port numbers and URLs that RiskMinder uses. It contains the following sections:

Default Port Numbers

During RiskMinder installation, the installer checks if the required default port number is in use. If the port number is not in use, then the installer assigns it to the RiskMinder component. However, if the default port number is already in use by an Advanced Authentication product or by any other application, then specify the port number manually by using the RiskFort Protocol Setup screen in Administration Console.

The following table lists the default port numbers that are used by RiskMinder.

Protocol	Default Port Number	Description
RiskMinder Server		
Native (TCP)	7680	This is a proprietary protocol used by RiskMinder for the purpose of risk evaluation. This port is used for communication between the RiskMinder Server instance and the RiskMinder Java SDKs (which include Risk Evaluation.)
Native (SSL)	7681	This is a proprietary protocol to enable SSL-based communication between the RiskMinder Server instance and the RiskMinder Java SDKs (which include Risk Evaluation.)

Protocol	Default Port Number	Description
Administration Web Service	7777	This protocol is used for communication between RiskMinder Server and Administration Web services, and is used to create and manage rule configurations. **Note:** These calls do *not* include the Risk Evaluation or User and Organization Management calls.
Transaction Web Service	7778	This protocol is used by the Risk Evaluation Web service to connect to the RiskMinder Server instance. **Note:** These calls do *not* include the Administration service calls.
Server Management	7980	This protocol is used by Administration Console to communicate with the RiskMinder Server instance for server management activities (such as, graceful shutdown, server cache refresh, instance management, and protocol management).
Case Management Queuing Server **Book:** See *CA RiskMinder Administration Guide* for detailed information about Case Management.		
Case Management Queueing Server	7779	This protocol is used by the Case Management Queuing Server module to listen to the Case Management requests (at the server end) on the specified port.
Case Management Queueing Administration	7780	This protocol is used by Administration Console to communicate with the Case Management Queuing Server instance for server management activities (such as, graceful shutdown, server cache refresh, instance management, and protocol management).

Important! If another service is already running on the default ports that RiskMinder uses, then set a new port number for the protocols.
To set a new port number for the protocols, use the Protocol Configuration page in Administration Console. See Chapter 4, "Managing RiskMinder Server Instances" in *CA RiskMinder Administration Guide*.

URLs for RiskMinder Components

Use the URLs listed in the following table to access RiskMinder components after installation. The URLs in the table use the default ports.

Component or Service	URL
Administration Console (For Master Administrator (MA))	*http://<rf_hostname>:<appserver_port>/arcotadmin/masteradminlogin.htm* **Note:** The port that you must specify here is your application server port.
Administration Console (For Other Administrators)	*http://<rf_hostname>:<appserver_port>/arcotadmin/adminlogin.htm* **Note:** The port that you must specify here is your application server port.
Sample Application	*http://<rf_hostname>:<appserver_port>/riskfort-3.1.01-sample-application/index.jsp* **Note:** The port that you must specify here is your application server port.
Risk Evaluation Web Service	*http://<rf_hostname>:<rf_port>/services/RiskFortEvaluateRiskSvc* **Note:** The default port here is 7778.
RiskMinder Administration Web Service	*http://<rf_hostname>:<rf_port>/services/ArcotRiskFortAdminSvc* **Note:** The default port here is 7777.

Component or Service	URL
User Management Web Service	*http://*<appserver_hostname>:<appserver_port>*/arcotuds/services/ArcotUserRegistrySvc* **Note:** The port that you must specify here is your application server port where UDS has been deployed.
Organization Management Web Service	*http://*<appserver_hostname>:<appserver_port>*/arcotuds/services/ArcotUserRegistryMgmtSvc* **Note:** The port that you must specify here is your application server port where UDS has been deployed.
Configuration Registry Web Service	http://<appserver_hostname>:<appserver_port>/arcotuds/services/ArcotConfigRegistrySvc **Note:** The port that you must specify here is your application server port where UDS has been deployed.

Appendix G: Configuring Application Server for Database Connection Pooling

Typically, accessing the database may not be a bottleneck, but setting up a new connection for each request can be an overhead and can bring down the performance of the system. By implementing database connection pooling, you can avoid the overhead of creating a database connection every time a RiskMinder component deployed on your application server requires access to the database.

This appendix outlines the steps for:

- Enabling Database Connection Pooling (see page 263)
- Enabling LDAP Connection Pooling (see page 271)
- Enabling Apache Tomcat Security Manager (see page 276)

Enabling Database Connection Pooling

This section quickly walks you through the steps to set up database connection pooling on the application server, where you have deployed RiskMinder components. The configuration steps for the following supported application servers are covered:

- Apache Tomcat (see page 264)
- IBM WebSphere (see page 267)
- Oracle WebLogic (see page 269)
- JBoss Application Server (see page 270)

Apache Tomcat

This section provides the steps to enable Apache Tomcat for JNDI-based database operations. To create a JNDI connection in Apache Tomcat:

1. Install the Apache Tomcat application server and test the installation by using the following URL:

   http://localhost:8080/

2. Open the server.xml file present in the <TOMCAT_HOME>/**conf**/ directory.

3. Collect the following information for defining a data source:

   - **JNDI Name**

     The JNDI name that is used by the Advanced Authentication components.

     Important! This name *must* match with the AppServerConnection PoolName.*N* in arcotcommon.ini (see page 204) (*without* the java:comp/env/ prefix).

   - **User ID**

     The database user ID.

   - **Password**

     The database password.

   - **JDBC Driver Class**

     The JDBC driver class name, for example:
     `oracle.jdbc.driver.OracleDriver`

   - **JDBC URL**

     The JDBC URL for the database server, for example, if you are using the Oracle driver, then the URL is in the following format:
     `jdbc:oracle:thin:<server>:<database_port>:<sid>`

4. Add the following entry to define the data source within the <GlobalNamingResources> tag:

```
<Resource name="SampleDS"
        auth="Container"
        type="javax.sql.DataSource"
        factory="org.apache.tomcat.dbcp.dbcp.BasicDataSourceFactory"
        username="<userid>"
        password="<password>"
        driverClassName="<JDBC driver class>"
        url="<jdbc-url>"
        maxWait="30000"
        maxActive="32"
        maxIdle="8"
        initialSize="4"
        timeBetweenEvictionRunsMillis="300000"
        minEvictableIdleTimeMillis="30000"/>
```

5. Open the context.xml file available in the *<TOMCAT_HOME>*/**conf**/ directory.
6. Add the following entry to define the datasource within the <Context> tag:
   `<ResourceLink global="SampleDS" name="SampleDS" type="javax.sql.DataSource"/>`
7. To enable database connection pooling, download the following files from the corresponding third-party source. Then, copy these files to *<TOMCAT_HOME>*/common/lib (on Apache Tomcat 5.x) or *<TOMCAT_HOME>*/lib (on Apache Tomcat 6.x and 7.x).
   - commons-dbcp-1.2.2.jar
   - ojdbc14-10.2.0.1.0.jar (for Oracle database)
   - sqljdbc.jar (Microsoft JDBC driver for Microsoft SQL Server 2005 - version 1.2.2828)
   - mysql-connector-java-5.1.22-bin.jar (for MySQL database)

Configuration changes for Tomcat8 (apache-tomcat-8.0.24) and JDK8 (1.8.0_51)

1. Create JNDI connection

   There are few configuration attribute names that have been updated in tomcat 8. Couple of them are listed in the sample here. Verify your attribute names from tomcat 8 documentation if you are using any others which are not shown in the sample.

   <Resource name="< data source_name >" auth="Container"

   type="javax.sql.DataSource" username="USER_ID" password="PASSWORD"

   driverClassName="JDBC_Driver_Class " url="JDBC_url" maxWaitMillis="30000"

   maxTotal="32" maxIdle="4" initialSize="4"

   timeBetweenEvictionRunsMillis="600000"

   minEvictableIdleTimeMillis="600000"/>

   Note :

   The **maxActive** configuration option has been renamed to **maxTotal**

   The **maxWait** configuration option has been renamed to **maxWaitMillis**
2. Make sure you use the latest database jar.
   - For sql server - sqljdbc4.jar
   - For oracle ojdbc6.jar
3. Enable SSLv3

   Java 8 disables SSLv3 by default. To enable it follow these steps:

   1. Go to “<JRE_HOME>\lib\security” folder used by tomcat.

2. Open java.security file.
3. Check if the property “jdk.tls.disabledAlgorithms” has SSLv3, if yes remove the SSLv3 value.

IBM WebSphere

This section provides the steps to enable IBM WebSphere for JNDI-based database operations. To configure an IBM WebSphere instance for deploying Java-dependent components of RiskMinder:

1. Log in to WebSphere Administration Console.
2. Select Resources and expand the JDBC node.
3. Click JDBC Providers.

   The JDBC Providers page appears.
4. In the Preferences section, click New to create a JDBC provider that is based on the database that you are using.

   The Create a new JDBC Provider page appears.
5. Perform the following tasks to create the JDBC Provider.

   Note: For more information, refer to: *http://publib.boulder.ibm.com/infocenter/wasinfo/v6r1/topic/com.ibm.websphere.base.iseries.doc/info/iseries/ae/tdat_ccrtprov.html*

   a. Specify the Database Type and Provider Type.

   b. Select Connection pool data source from the Implementation Type drop-down list.

   c. Enter a Name for the JDBC provider. You can also enter a Description for the JDBC Provider.

   d. Click Next.

      The Enter database class path information screen appears.

   e. Enter the absolute path for the JAR file.

   f. Click Next.

      The Summary screen appears.

   g. After reviewing the summary of the information that you have entered, click Finish to complete the JDBC provider configuration.
6. Set the CLASSPATH for the JDBC provider that you created in Step 5.

   a. Click Resources and expand the JDBC node.

   b. Click JDBC Providers.

      The JDBC Providers page appears.

   c. Click the JDBC Provider that you created in Step 5.

   d. Set the Class Path for the JDBC JAR.

   e. Click Apply to save the changes.
7. Create a Data Source, as follows:

a. Go to Resources, and then click JDBC.

b. Under JDBC, open Data Sources and click New. Perform the following steps to create a data source:

c. Specify the Data source name.

d. Specify the JNDI name.

Note: This name *must* match with the value of AppServerConnection PoolName.*N* in arcotcommon.ini.

e. Click Next.

f. Select an existing JDBC provider that is created in Step 3.

g. Click Next.

The Enter database specific properties for the data source screen appears.

h. Depending on the database, enter the following information:

- **For Oracle Database**:

  Specify the **Value** for JDBC URL. This URL would be of the following type: `jdbc:oracle:thin:@<server>:<oracle_port>:<sid>`

  Select the **Data store helper class name**.

- **For Microsoft SQL Server:**
  `jdbc:sqlserver://<server>:<sql_port>;databaseName=<database name>;selectMethod=cursor`

- **For MySQL:**
  `jdbc:mysql://<server>:<mysql_port>/<database>`

i. Click Next.

The Setup Security aliases screen appears.

j. Click Next to view the Summary screen, and then click Finish.

8. Click the data source that you created in Step 7.
9. In the Related Items section, click JAAS - J2C authentication data.
10. Click New to create a credential.
11. Enter login credentials that are used to connect to the database and save the credential.
12. Click Apply, and then click OK to save the changes.
13. Click Data Sources and select the data source that you created in Step 7.
14. Under Security Settings > Component-managed authentication alias, select the JAAS credential that you created in Step 11 and click Apply, and then OK.
15. Click Data Sources and select the check box for the data source you created in Step 7.
16. Click Test connection to verify that you have specified the connection correctly.

Note: This test only checks the connection to the database server, not necessarily the correct definition of the data source.

Oracle WebLogic

This section walks you through the steps to enable Oracle WebLogic for JNDI-based database operations. To create a data source for RiskMinder in Oracle WebLogic:

1. Log in to WebLogic Administration Console.
2. Click the **Lock & Edit** button in the Change Center, if it is not already done.
3. Navigate to **Services**, **JDBC**, and the **Data Sources**.
4. Under **JDBC**, open **Data Sources** and click **New** to open the Create a New JDBC Data Source page.
5. Set the following JNDI and the database information:
    a. Set **Name** = ArcotDB

       Note: This name *must* match with the value of AppServerConnection PoolName.*N* in arcotcommon.ini.

    b. Set **JNDI Name** = ArcotDB

    c. Select the required **Database Type**, for example, Oracle.

    d. Select the required **Database Driver**, for example, Oracle Thin Driver.
6. Click **Next**, retain the default values, and click **Next** again.
7. In the Connection Properties page that appears, set the database connection details. For example, the values for **Oracle** can be:
    - **Database Name** = SID or service name of the database server
    - **Host Name** = Host name or the IP address of the database server
    - **Port** = 1521 or any other port at which the database server is running
    - **Database User Name** = Database account user name that can create the database connections
    - **Password** / **Confirm Password** = Password for the specified Database User Name
8. Click **Next**.
9. Click **Test Configuration** to verify the database information that you specified.
10. Click **Next** and set the preferred data source target server for the WebLogic server instance.
11. Click **Finish** to return to the data source list page.
12. Click the **Activate** button in the Change Center to enable the data source settings that you configured in the preceding steps.

JBoss Application Server

This section walks you through the steps to enable JBoss Application Server for JNDI-based database operations. To create a data source for RiskMinder in JBoss Application Server:

1. Navigate to the location where you have deployed the WAR files, for example: `<JBOSS_HOME>/server/default/deploy/`
2. Create a data source descriptor file called arcotdatabase-ds.xml.
3. Collect the following information that is required to define a data source in the arcotdatabase-ds.xml file:
   - **JNDI Name:** The JNDI name that is used by the Advanced Authentication components. This name must match with the AppServerConnection PoolName.*N* in arcotcommon.ini (*without* the java:comp/env/ prefix).
   - **User ID:** The database user ID.
   - **Password:** The database password.
   - **JDBC Driver Class:** The JDBC driver class name. For example, oracle.jdbc.driver.OracleDriver.
   - **JDBC URL:** The JDBC URL for the database server.

     For example, if you are using Oracle driver, then the URL will be: jdbc:oracle:thin:*<server>*:*<database_port>*:*<sid>*.
   - **Exception Sorter Class:** The class for implementing the org.jboss.resource.adapter.jdbc.ExceptionSorter interface, which determines whether the exception indicates a connection error.

     Use this parameter for Oracle Database *only*. Set it to org.jboss.resource.adapter.jdbc.vendor.OracleExceptionSorter.
4. Open the arcotdatabase-ds.xml in a text editor.
5. Add the following content:

```
<?xml version="1.0" encoding="UTF-8"?>
<datasources>
<local-tx-datasource>
<jndi-name>SampleDS</jndi-name>
<connection-url><jdbcurl></connection-url>
<driver-class><JDBC Driver class></driver-class>
<user-name><database_userid></user-name>
<password><database_password></password>
<exception-sorter-class-name><Exception Sorter
Class></exception-sorter-class-name>
</local-tx-datasource>
</datasources>
```

6. Save and close the file.

Enabling LDAP Connection Pooling

The procedure to enable LDAP connection pooling depends on the application server that you are using:

- Apache Tomcat (see page 271)
- IBM WebSphere (see page 272)
- Oracle WebLogic (see page 273)
- JBoss Application Server (see page 275)

Apache Tomcat

To create an LDAP connection pool:

1. Install the Apache Tomcat application server and test the installation by using the following URL:

   http://localhost:8080/

   The preceding URL must open the Apache Tomcat home page.
2. Navigate to the following location:
   <TOMCAT-HOME>/conf/
3. Open the catalina.properties file in a text editor.
4. Add the following entries to the file:
   - com.sun.jndi.ldap.connect.pool.protocol=plain ssl
   - com.sun.jndi.ldap.connect.pool.authentication=simple
   - com.sun.jndi.ldap.connect.pool.maxsize=64
   - com.sun.jndi.ldap.connect.pool.prefsize=32
   - com.sun.jndi.ldap.connect.pool.timeout=240000
   - com.sun.jndi.ldap.connect.pool.initsize=8
5. Save and close the file.
6. Restart the application server.

IBM WebSphere

Perform the following steps to create an LDAP connection pool:

1. Log in to WebSphere Administration Console.
2. Navigate to **Servers** > **Server Types** > **WebSphere application servers**.
3. The Application servers page appears.
4. Click the Server that you want to configure.
5. In the **Server Infrastructure** section, click **Java and Process Management**.
6. Click the **Process Definition** link.
7. In the **Additional Properties** section, click **Java Virtual Machine**.
8. In the **Additional Properties** section, click **Custom Properties.**
9. Click **New** to add custom properties.

   The **General Properties** section appears.
10. Add the configurations that are listed in the following table as name-value pairs in the **General Properties** section. Repeat the process for each name-value pair.

Name	Value
com.sun.jndi.ldap.connect.pool.maxsize	64
com.sun.jndi.ldap.connect.pool.prefsize	32
com.sun.jndi.ldap.connect.pool.initsize	8
com.sun.jndi.ldap.connect.pool.timeout	240000
com.sun.jndi.ldap.connect.pool.protocol	plain ssl
com.sun.jndi.ldap.connect.pool.authentication	simple

11. Click **Apply**.
12. Restart WebSphere.

Oracle WebLogic

Including LDAP Options in Startup Script

This section provides the steps to include the LDAP connection pool parameters in WebLogic server startup script:

1. Log in to the system
2. Create a backup copy of the WebLogic Server startup script. This script is available at the following location:
   `domain-name/bin/startWebLogic.sh`
3. Open the script in a text editor.
4. Add the following entries in the section that is used to start the WebLogic server.
   - -Dcom.sun.jndi.ldap.connect.pool.maxsize=64
   - -Dcom.sun.jndi.ldap.connect.pool.prefsize=32
   - -Dcom.sun.jndi.ldap.connect.pool.initsize=8
   - -Dcom.sun.jndi.ldap.connect.pool.timeout=240000
   - -Dcom.sun.jndi.ldap.connect.pool.protocol="plain ssl"
   - -Dcom.sun.jndi.ldap.connect.pool.authentication=simple

   The following code snippet shows a sample script with LDAP connection pool parameters:

```
# START WEBLOGIC
echo "starting weblogic with Java version:"
${JAVA_HOME}/bin/java ${JAVA_VM} -version
if [ "${WLS_REDIRECT_LOG}" = "" ] ; then
echo "Starting WLS with line:"
echo "${JAVA_HOME}/bin/java ${JAVA_VM} ${MEM_ARGS} ${JAVA_OPTIONS}
-Dweblogic.Name=${SERVER_NAME} -Djava.security.poli
cy=${WL_HOME}/server/lib/weblogic.policy ${PROXY_SETTINGS} ${SERVER_CLASS}"
${JAVA_HOME}/bin/java ${JAVA_VM} ${MEM_ARGS} ${JAVA_OPTIONS}
-Dcom.sun.jndi.ldap.connect.pool.maxsize=64
-Dcom.sun.jndi.ldap.connect.pool.prefsize=32
-Dcom.sun.jndi.ldap.connect.pool.initsize=8
-Dcom.sun.jndi.ldap.connect.pool.timeout=240000
-Dcom.sun.jndi.ldap.connect.pool.authentication=simple
-Dcom.sun.jndi.ldap.connect.pool.protocol="plain ssl"
-Dweblogic.Name=${SERVER_NAME}
-Djava.security.policy=${WL_HOME}/server/lib/weblogic.policy
${PROXY_SETTINGS} ${SERVER_CLASS}
else
echo "Redirecting output from WLS window to ${WLS_REDIRECT_LOG}"
```

```
${JAVA_HOME}/bin/java ${JAVA_VM} ${MEM_ARGS} ${JAVA_OPTIONS}
-Dweblogic.Name=${SERVER_NAME}
-Djava.security.policy=${WL_HOME}/server/lib/weblogic.policy
${PROXY_SETTINGS} ${SERVER_CLASS} >"${WLS_REDIRECT_LOG}" 2>&1
fi
```

5. Save and close the file.
6. Restart WebLogic Server.

Specifying LDAP Pool Options Using Managed Server

1. Log in to WebLogic Administration Console.
2. Click the **Lock & Edit** button, if it is not done.
3. In the **Domain Structure** pane, Navigate to **Environment** > **Servers**.
4. Click the server that you want to configure.
5. In the right pane, click **Server Start**.
6. In the **Arguments** field, include the following space-separated JVM options:
   - -Dcom.sun.jndi.ldap.connect.pool.maxsize=64
   - -Dcom.sun.jndi.ldap.connect.pool.prefsize=32
   - -Dcom.sun.jndi.ldap.connect.pool.initsize=8
   - -Dcom.sun.jndi.ldap.connect.pool.timeout=240000
   - -Dcom.sun.jndi.ldap.connect.pool.protocol=plain ssl
   - -Dcom.sun.jndi.ldap.connect.pool.authentication=simple
7. Click **Save** and then **Activate Changes**.
8. Restart Oracle WebLogic Server.

JBoss Application Server

Perform the following steps to create an LDAP connection pool:

1. Navigate to the following location:
   <*JBOSS_HOME*>/server/<Profile>/deploy/
2. Open properties-service.xml file in a text editor.
3. Add the following properties to the <attribute name="Properties"> section:
   - com.sun.jndi.ldap.connect.pool.protocol=plain ssl
   - com.sun.jndi.ldap.connect.pool.authentication=simple
   - com.sun.jndi.ldap.connect.pool.maxsize=64
   - com.sun.jndi.ldap.connect.pool.prefsize=32
   - com.sun.jndi.ldap.connect.pool.timeout=240000
   - com.sun.jndi.ldap.connect.pool.initsize=8
4. Save and close the file.
5. Restart JBoss Application Server.

Enabling Apache Tomcat Security Manager

If you notice that RiskMinder does not work on Apache Tomcat after the Java **Security Manager** is enabled, then to enable Tomcat Security Manager to work with Advanced Authentication applications:

1. Add the security manager entries to the **JAVA_OPTS** environment variable, as follows:
   ```
   export CATALINA_OPTS="-Djava.security.manager
   -Djava.security.policy=<Tomcat_Home>/conf/catalina.policy"
   ```
2. Navigate to the following Apache Tomcat location:
   `<Tomcat_Home>/conf/`
3. Open the catalina.policy file in a text editor of your choice.
4. Add the following code in the **WEB APPLICATION PERMISSIONS** section.
   ```
   grant {
   permission java.io.FilePermission
   "${catalina.base}${file.separator}webapps${file.separator}arcotuds${file.sepa
   rator}-", "read";
   permission java.util.PropertyPermission "adb.converterutil", "read";
   permission java.lang.RuntimePermission "accessDeclaredMembers";
   permission java.security.SecurityPermission "putProviderProperty.BC";
   permission java.security.SecurityPermission "insertProvider.BC";
   permission java.security.SecurityPermission "putProviderProperty.SHAProvider";
   permission java.io.FilePermission "${arcot.home}${file.separator}-",
   "read,write";
   permission java.net.SocketPermission "*:1024-65535", "connect,accept,resolve";
   permission java.net.SocketPermission "*:1-1023", "connect,resolve";
   };
   ```
5. Add the following section to grant permission for Administration Console (arcotadmin) and User Data Service (arcotuds).
   ```
   grant codeBase "file:${catalina.home}/webapps/arcotuds/-" {
   permission java.lang.RuntimePermission "getenv.ARCOT_HOME", "";
   permission java.lang.RuntimePermission
   "accessClassInPackage.org.bouncycastle.asn1.*";
   permission java.security.AllPermission;
   };
   grant codeBase "file:${catalina.home}/webapps/arcotadmin/-" {
   permission java.lang.RuntimePermission "getenv.ARCOT_HOME", "";
   permission java.security.AllPermission;
   };
   ```
6. Save and close the file.
7. Restart Apache Tomcat.

Appendix H: Deploying Administration Console on IBM WebSphere 7.0

If you plan to deploy Administration Console on IBM WebSphere 7.0, you may see an HTTPCLIENT error when you access some Administration Console pages, such as Instance Management. In such cases, perform the following steps:

1. Access the Administration Console WAR file from *<install_location>*/arcot/java/webapps/.
2. Copy arcotadmin.war to a temporary directory, say /opt/arcot_temp.
3. Extract the arcotadmin.war file contents.

   Of the JARs that are extracted to the /opt/arcot_temp/WEB_INF/lib directory, the following JARs are used to create the shared library in IBM WebSphere:

   - axiom-api-1.2.10.jar
   - axiom-impl-1.2.10.jar
   - axis2-java2wsdl-1.5.2.jar
   - backport-util-concurrent-3.1.jar
   - commons-httpclient-3.1.jar
   - commons-pool-1.5.5.jar
   - axiom-dom-1.2.10.jar
   - axis2-adb-1.5.2.jar
   - axis2-kernel-1.5.2.jar
   - commons-codec-1.3.jar
   - commons-logging-1.1.1.jar
   - log4j-1.2.16.jar
   - axis2-transport-http-1.5.2.jar
   - axis2-transport-local-1.5.2.jar
4. Log in to WebSphere Administration Console.

5. Click Environment, and then click Shared Libraries.
    a. From the Scope drop-down, select a valid visibility scope. The scope must include the target server or node on which the application is deployed.
    b. Click New.
    c. Enter the Name, for example, ArcotAdminSharedLibrary.
    d. Specify the Classpath. Enter the path and file name for all the JAR files that are extracted in Step 3.

        For example:
        `/opt/arcot_temp/WEB_INF/lib/axiom-api-1.2.10.jar`
    e. Click Apply to save the changes.
6. Navigate to the location (<install_location>/arcot/java/webapps/) where the Administration Console WAR file is located.
7. Deploy arcotadmin.war in the application server.
8. Configure shared library, as follows:
    a. Click Applications, and then click WebSphere enterprise applications.
    b. Click arcotadmin_war.
    c. In the References section, click Shared library references.
    d. Select arcotadmin_war and click Reference shared libraries.
    e. Select the ArcotAdminSharedLibrary from the Available list and move it to the Selected list.
    f. Click OK to save the configurations.
9. Configure the class loader order and policy as follows:
    a. Click Applications, Application Types, and then click WebSphere enterprise applications.
    b. Click arcotadmin_war.
    c. Click Class loading and update detection link.
    d. In the Class loader order section, select the Classes loaded with local class loader first (parent last) option.
    e. In the WAR class loader policy section, select the Single class loader for application option.
    f. Click OK to save the configurations.
10. Ensure that the application is restarted.

Appendix I: Adding Custom Actions

Each channel in RiskMinder has a set of actions associated with it. An action, in turn, has data elements associated with it. A rule in RiskMinder is a specific combination of the elements associated with an action for a channel or set of channels.

This section describes the procedure to add a custom action. While adding a custom action, you specify the channel with which the action must be associated. The elements that are associated with that channel are automatically associated with the new action. You can use these elements to build rules for the new action.

Note: If you plan to build rules for actions that are available in all channels, then first add the action in each channel.

Follow these steps:

1. (Optional) Perform the following steps if you do not know the name of the channel with which you want to associate a new action:
   a. Log in to the Administration Console as a GA.
   b. Click the Services and Server Configurations tab.
   c. Under the Rules Management section on the side-bar menu, click the Rules and Scoring Management link.

      The Rules and Scoring Management page opens.
   d. Select any ruleset from the Select a Ruleset list.
   e. Click Add a New Rule.
   f. Select any ruleset from the Select a Ruleset list.
   g. Click Add a New Rule.

      The RiskFort Rule Builder page opens.
   h. Note down the name of the channels for which you want to add new actions.
2. Ensure that you have the database privileges that are listed in Configuring the Database Server (see page 54).
3. Log in to the database.
4. Run the following command to determine the ID of the channel to which you want to add the action:

   ```
   select channelid from arrfchannel where
   channelname='<channel-name>';
   ```

   In this command, replace *<channel-name>* with the name of the channel.

5. Run one of the following commands:

   Note: In the command that you run, replace *<channel-id>* with the channel ID that you determine by running the previous step. Similarly, replace *<action-name>* with the name of the channel. The action name can contain alphanumeric characters and the underscore character. No other character can be used in the action name.

   - For Microsoft SQL Server:
     ```
     EXEC ADD_CUSTOM_ACTION <channel-id>, '<action-name>'
     ```
   - For Oracle Database:
     ```
     set serveroutput on;
     execute ADD_CUSTOM_ACTION(<channel-id>, '<action-name>');
     ```
   - For MySQL:
     ```
     call ADD_CUSTOM_ACTION(<channel-id>, '<action-name>');
     ```

   The following message appears:
   ```
   "New action added successfully for the given channel."
   ```

   The new action is added in the database.

6. Refresh cache. See the *CA RiskMinder Administration Guide* for instructions.
7. Verify that the action has been successfully added as follows:
   a. Log in to the administration console.
   b. Navigate to the Rules and Scoring Management screen.
   c. Click Add a new rule.
   d. Check whether the newly added action is displayed in the Actions list.

   After you verify that the action has been added, you can start using it to build new rules.

Appendix J: Troubleshooting RiskMinder Errors

This appendix describes troubleshooting steps for resolving errors that you may face while using RiskMinder. The troubleshooting topics are classified as follows:

Before you perform any troubleshooting tasks, check the RiskMinder log files to see if there were any errors. By default, all the log files are saved in the *<install_location>*/arcot/logs/ directory. The following table lists the default log file names of the RiskMinder components.

RiskMinder Component	File Name	Description
RiskMinder Server	arcotriskfortstartup.log	This file records all the start-up (or boot) actions. The information in this file is very useful in identifying the source of the problems if the RiskMinder service does not start up. All requests processed by the server.
	arcotriskfort.log	This file records all requests processed by the Server after its startup.
Case Management Server	arcotriskfortcasemgmtserver.log	This file records all the start-up (or boot) actions for Case Management. The information in this file is very useful in identifying the source of the problems if the Case Management service does not start up.
	arcotriskfortcasemgmtserverstartup.log	This file records all requests processed by the Case Management Server after its startup.
Administration Console	arcotadmin.log	This file records the Administration Console operations.
User Data Service	arcotuds.log	This file records the User Data Service (UDS) operations.

Note: See appendix, "RiskMinder Logging" in *CA RiskMinder Administration Guide* for detailed information about these log files.

Installation Errors

Problem:

I cannot find arcotadmin.war in *<install_location>*/arcot/java/webapps directory.

Cause:

The installer failed to create the arcotadmin.war WAR file during installation.

Solution:

If the file was not automatically created, manually create it as follows:

1. Open the command prompt window.
2. Ensure that the ARCOT_HOME environment variable is set.
3. Navigate to *<install_location>*/arcot/tools/common/bundlemanager directory.
4. Run bundlemanager as follows:
   ```
   java -jar bundle-manager.jar
   ```
   The preceding command generates the arcotadmin.war file in *<install_location>*/arcot/java/webapps directory.

Problem:

I cannot start the RiskMinder Server (**Arcot RiskFort Service**). I see the following error in arcotriskfortstartup.log:

```
Failed DBPoolManager initialization
```

or

```
Datasource Name Not Found
```

Cause:

One of the following issues may be the cause of this problem:

- The DSN for your database was not created as System DSN.
- You are using a 64-bit platform. As a result, the DSN was created by using the 64-bit ODBC Manager.

Solution:

You can verify the DSN-related issues in arcotcommon.ini. If the problem is DSN-related, then:

1. To resolve the first cause, ensure that the DSN is a System DSN as follows:

a. Run the ODBCConfig tool as root.

b. Activate the **System DSN** tab, and verify that your DSN exists here. If the DSN does not exist, re-create it with the same name as earlier.

c. Restart the service.

2. To resolve the second issue (if you are using a 64-bit platform), use the 32-bit version of the ODBC Manager.

Note: For detailed information about arcotcommon.ini and other configuration files, see Configuration Files and Options (see page 201).

Problem:

I cannot start the RiskMinder Server (**Arcot RiskFort Service**). The error message indicates that the service starts and stops automatically.

Cause:

A possible cause for this issue may be that you specified details for a database during installation, but the data source was not successfully created.

Solution:

To resolve this issue:

1. Verify if there is a corresponding entry for the DSN in arcotcommon.ini.
   - If entry not found, manually create the DSN.
   - If you found the entry, then clean up the database (See "Dropping RiskMinder Schema" (see page 186) in appendix) and reseed the database, as described in Section, "Running Database Scripts" (see page 77).
2. Restart the RiskMinder Server.

Problem:

When I launch the Administration Console for the first time ("Logging In to Administration Console" in Chapter 5 (see page 89)) as the Master Administrator, I see the following message:

```
The server encountered an internal error that prevented it from
fulfilling this request."
```

I see the following error in the arcotadmin.log file:

```
adminLog: java.lang.UnsatisfiedLinkError: no ArcotAccessKeyProvider
in java.library.path
```

Cause:

The JAVA library does not include the path to one of the following files:

- libArcotAccessKeyProvider.so
- arcot-crypto-util.jar

Solution:

Perform the following steps:

1. Ensure that the LD_LIBRARY_PATH variable includes the absolute path to the following files:
   - libArcotAccessKeyProvider.so
   - arcot-crypto-util.jar

   Depending on the type of deployment, see one of the following sections for information about the location of these files:
   - For a single system deployment, see Step 2: Copying Database Access Files to Your Application Server (see page 80).
   - For a distributed system deployment, see Step 2: Copying Database Access Files to Your Application Server (see page 119).
2. Restart the application server.

Problem:

I do not see the log file (arcotadmin.log, arcotuds.log, casemanagementserver.log, or riskfortserver.log) in the logs directory in ARCOT_HOME.

Cause:

One of the following issues may be the cause of this problem:

- ARCOT_HOME may not be correctly set during installation.
- The application server JAVA HOME may be pointing to JRE instead of the JDK HOME.

Solution:

To resolve these issues, you must:

- Ensure that you reset the ARCOT_HOME to point to the correct location. Typically, this is <*installation_location*>/arcot/.

As a result of this, when you use the cd $ARCOT_HOME command in the command prompt window, your current directory must change to <*installation_location*>//arcot/.

- Ensure that you copy the libArcotAccessKeyProvider.so and arcot-crypto-util.jar files in the application server JAVA HOME location.

  Depending on the type of deployment, see one of the following sections for information about the location of these files:

  - For a single system deployment, see Step 2: Copying Database Access Files to Your Application Server (see page 80).
  - For a distributed system deployment, see Step 2: Copying Database Access Files to Your Application Server (see page 119).

Problem:

I deployed the UDS WAR (arcotuds.war), but the UDS is not coming up.

Cause:

One of the possible causes may be that the application server JAVA HOME may be pointing to the JRE instead of the JDK HOME.

Solution:

To resolve this issue:

Ensure that you have copied the libArcotAccessKeyProvider.so and arcot-crypto-util.jar files in the application server JAVA HOME location. Depending on the type of deployment, see one of the following sections for information about the location of these files:

- For a single system deployment, see Step 2: Copying Database Access Files to Your Application Server (see page 80).
- For a distributed system deployment, see Step 2: Copying Database Access Files to Your Application Server (see page 119).

Database-Related Errors

Problem:

I ran the RiskMinder database scripts and I did not see any errors. However when i try to access a RiskMinder table, I see an error message stating that the table does not exist.

or

I am using Oracle Database and I see the following error when I try to access a table:

```
ERROR : common.database.DBFOManagerImpl(65) : Failed to retrieve
Database error codes for Datasource[1]. Error: ORA-00942: table or
view does not exist.
```

Cause:

- The database user that you used to run the scripts did not have the required file permissions.
- You did not run the database scripts in the specified order.

Solution:

Perform the following steps:

1. Ensure that the user has the right file permissions.
2. Clean up the database.

   See section, "Dropping RiskMinder Schema" (see page 186) for detailed instructions.
3. Run the database scripts again *in the right order*.

   See section, "Running Database Scripts" (see page 77) for more information in case of single-system installation.

   See section, "Running Database Scripts" (see page 117) for more information in case of distributed-system installation.
4. Run the following query to verify if the database was seeded correctly:

   ```
   SELECT SERVERNAME, VERSION FROM ARRFSERVERS;
   ```

Problem:

The connection to my Oracle database fails with the following entry in the RiskMinder Server log file:

```
ReportError: SQL Error State:08001, Native Error Code: 30FD, ODBC
Error: [DataDirect][ODBC Oracle driver][Oracle]ORA-12541: TNS:no
listener
```

Solution:

Check the following:

- Listener service on your database server.
- The TNSnames.ora file settings on the system where RiskMinder Server is installed.

Problem:

Connection to the Oracle database fails with the following entry in the RiskMinder Server log file:

```
TNS:listener could not resolve SERVICE_NAME given in connect
descriptor
```

Solution:

Check the following:

- Database is started. If it is not started, the above message is displayed.
- If the database is running, probably the database has not registered yet with the listener. This occurs when the database or listener just starts up. Typically, this problem should be solved by waiting a minute or so.
- If you are using static registration, ensure that the SERVICE_NAME entry used in the connection string (TNSNAMES.ORA, NAMES, OID, ...) matches a valid service know to the listener.
- You can use C:>tnsping SERVICE_NAME - to check the status or C:>lsnrctl services - to verify all the services known to the listener.

Problem:

Connection to the Oracle database fails with the following entry in the RiskMinder Server log file:

```
ORA-03113: end-of-file on communication channel
```

Cause:

This is a generic error that indicates that the connection has been lost. This can be caused by reasons such as:

- Network issues or problems
- Forceful disconnection of a Server session
- Oracle Database crash

- Database Server crash
- Oracle internal errors, such as ORA-00600 or ORA-07445, causing aborts
- Oracle Client or TNS layer inability to handle the connections

Solution:

Check for the possible causes mentioned in the preceding list.

Problem:

Connection to the database fails with the following entry in the RiskMinder Server log file:

```
Database password could not be obtained from securestore.enc
```

Cause:

The database details may not be available in the securestore.enc file.

Solution:

Use the DBUtil tool to update the securestore.enc file with the database details.

Note: See the *CA RiskMinder Administration Guide* for more information about how to use DButil.

Problem:

Connection to the Microsoft SQL Server database fails with the following error:

```
java.sql.SQLException: No Datasource is set.
```

Cause:

The possible reason for this problem may be that the required JDBC JAR file may not be copied or may not be copied to the correct location on the application server you are using.

This is because the Administration Console, User Data Service (UDS), and Sample Application, which are Java-dependent components of RiskMinder, need JDBC JAR files to connect to the database.

Solution:

Perform the following steps:

1. If required, download the JDBC JAR file for the database you are using:
   - **For Oracle Databases:** ojdbc14.jar (version 10.2.0.1.0)
   - **For Microsoft SQL Server Databases:** sqljdbc.jar (version 1.2.2828)
   - **For MySQL:** mysql-connector-java-5.1.22-bin.jar
2. Copy or deploy the JDBC JAR:
   - If you are using Apache Tomcat, then refer to the "Apache Tomcat" subsection of the "Step 3: Copying JDBC JAR Files to Your Application Server" (see page 83) section.
   - If you are using IBM WebSphere, then refer to the "IBM WebSphere" subsection of the "Step 3: Copying JDBC JAR Files to Your Application Server" (see page 83) section.
   - If you are using Oracle WebLogic, then refer to the "Oracle WebLogic" subsection of the "Step 3: Copying JDBC JAR Files to Your Application Server" (see page 83) section.
   - If you are using JBoss Application Server, then refer to "JBoss Application Server" subsection of the "Step 3: Copying JDBC JAR Files to Your Application Server" (see page 83) section.

RiskMinder Server Errors

Problem:

I am trying to restart RiskMinder Server, but it is not coming up. The last line in arcotriskfortstartup.log shows the following error:
`Cannot continue due to ARRF_LIB_init failure, SHUTTING DOWN`

Cause:

The possible cause may be that you have configured a rule that requires $$*rulelibname*$$.so, but this SO is not present in the $ARCOT_HOME/plugins/rules/ directory.

Solution:

Perform the following steps:

1. Search for the occurrences of the following string:
   `Couldn't find symbol [$$`*`RULENAME`*`$$] in library [$$`*`rulelibname`*`$$]`
2. If you find the preceding string, then copy the (corresponding) $$*rulelibname*$$.so to the $ARCOT_HOME/plugins/rules/ directory.
3. Search for the occurrences of the following string:
   `"Couldn't get function pointer for symbol [ARRF_AddOnRule] in lib [$$rulelibname$$]`
4. If you find the preceding string, then copy the (corresponding) $$*rulelibname*$$.so to the $ARCOT_HOME/plugins/rules/ directory.
5. If you do not see any of these log strings, it is recommended that you look for any ERROR or WARNING messages in the log file. It should provide you sufficient information to debug this issue.

Problem:

I am trying to restart RiskMinder Server, but it is not coming up. The last lines in arcotriskfortstartup.log show the following error:
`"Transport Exception on Admin channels: bind: Address already in use"`

```
"Cannot continue due to loadAdminProtocolsAndAddTranports failure,
SHUTTING DOWN"
```

Cause:

The possible cause for this issue is that the Server Management Port (Default Port Number: 7980) is already open on the host by some other process. While, RiskMinder Server requires a minimum of Server Management port to start up.

Solution:

Perform the following steps:

1. Open the system console window.
2. Navigate to $ARCOT_HOME.
3. Start RiskMinder Server in the debug mode, as follows:
   `arrfserver -debug -port <new_port>`

After the Server Management port is open, the Master Administrator can log in to the Administration Console and configure the other ports.

SDK Errors

Problem:

I have set a new RiskMinder configuration and I am trying to invoke Java APIs that use this new configuration, but I see the following error:
`Configuration not Found`

Cause:

You may not have restarted the RiskMinder Server.

Solution:

Restart the RiskMinder Server to use any new configurations.

Upgrade Errors

This section describes the troubleshooting steps that you can use to resolve errors that you may face while upgrading RiskMinder.

Problem:

The upgrade tool fails with the following error:

```
Error Occured: IO exception while parsing,
$ARCOT_HOME/tools/common/upgrade/xml/arcot-<riskfort>-upgrade-meta
-data.xml
```

Cause:

The upgrade tool could not find the arcot-<*product-name*>-upgrade-meta-data.xml file. Here, *product-name* can be either common or riskfort.

Solution:

Check if the arcot-<*product-name*>-upgrade-meta-data.xml file exists in $ARCOT_HOME/tools/common/upgrade/**xml/**.This error can commonly occur when the arcot-common-db-upgrade.zip file is not extracted using the **Extract To Here** option.

Problem:

The upgrade tool fails with the following error:

```
Internal Error: Could not initialize upgrade tool. Error:: Cannot load
JDBC driver class 'oracle.jdbc.driver.OracleDriver' Error Occured:
Upgrade Initialization Error:oracle.jdbc.driver.OracleDriver
```

Cause:

The upgrade tool could not find the JDBC library to connect to the database.

Solution:

Check whether the JDBC library is copied to the <*ARCOT_HOME*>/tools/common/upgrade/**lib** directory.

If the JDBC library is already copied, then check whether the name of the JDBC JAR file is correctly specified, as described in Step 6 in "Step 2: Migrating the Database for Common Components for RiskMinder 3.1.01" (see page 160) (in chapter, "Upgrading RiskMinder" (see page 149)). Also, check if the JDBC JAR file corresponds to the database configured in the arcotcommon.ini file against the DbType parameter.

Problem:

The upgrade tool fails with the following error:
`FATAL: ARCOT_HOME Environment Variable Not Set`

Cause:

ARCOT_HOME is not set.

Solution:

Set the ARCOT_HOME environment variable and run the upgrade tool.

Problem:

The upgrade tool fails with the following error:
`Error Occured: Upgrade Initialization Error:Could not create DBService instance"`

Solution:

Check if the user name and password are configured correctly in the arcotcommon.ini and securestore.enc files, respectively.

Problem:

The upgrade tool fails with the following error:
Error Occurred: Upgrade Initialization Error:Io exception: The Network Adapter could not establish the connection"

Solution:

Check if the JDBC URL is correct and points to the correct database. Ensure that the database is up and running.

Problem:

The upgrade tool fails with the following error:
`javax.crypto.BadPaddingException: Given final block not properly padded`

Cause:

The key label that is used to encrypt the data is not the same as the key used for decryption.

Solution:

Ensure that the master key label used to encrypt data in the database is the same as the key label used by the upgrade tool to decrypt data. The master key label is stored in the securestore.enc file in the <*ARCOT_HOME*>/conf directory.

Problem:

The upgrade tool fails with the following or similar error:
`"java.sql.SQLException: ORA-20010: -1031-ORA-01031: insufficient privileges"`

Cause:

The database user that is configured in the arcotcommon.ini file does not have sufficient database privileges to carry out the database upgrade.

Solution:

Ensure that the administrator performing the upgrade has the required database privileges. Installation time privileges are applicable to upgrade also.

Problem:

The upgrade tool fails with the following or similar error:
`"ORA-01536: space quota exceeded for tablespace"`

Cause:

The database user that is configured in the arcotcommon.ini file has exhausted the space quota in the tablespace.

Solution:

The DBA must increase the quota for the user. Restart the upgrade tool after you re-import the pre-upgrade data.

Problem:

After the upgrade process, the Administration Console fails to start and returns the following error:

```
ERROR : taglib.tiles.InsertTag : ServletException in
'/WEB-INF/jsp/dynamic/navbar_GA.jsp': File
&quot;/WEB-INF/jsp/dynamic/navbar_GA.jsp&quot;
```

Cause:

The Work folder of the application server where Administration Console is deployed still contains the cache of the earlier Administration Console version.

Solution:

Clear the Work folder of the application server where Administration Console is deployed and restart the application server.

Problem:

After the upgrade process, an administrator belonging to the LDAP repository can no longer log in to Administration Console.

Cause:

The administrator may be disabled in LDAP.

Solution:

Ensure that the administrator is not disabled in LDAP. Disabled administrators are not allowed to log in to Administration Console.

Problem:

After the upgrade process, RiskMinder Server or Case Management Server do not start and the following lines appear in the log file:

```
ArDBM::Executing
Query[ArRFProtocolRegistryQuery_InsertProtocolDetailsForInstance]
ArDBConnection::GetDBDiagnosis: SQL State:23000, Native Code: 1, ODBC code: [Arcot
Systems][ODBC Oracle Wire Protocol driver][Oracle]ORA-00001: unique constraint
(XXXXXXX.UN_ARPROTOCOLREGISTRY) violated
Dbm::SQL State:23000, Native Code: 1, ODBC code: [Arcot Systems][ODBC Oracle Wire
Protocol driver][Oracle]ORA-00001: unique constraint
(XXXXXXX.UN_ARPROTOCOLREGISTRY) violated
```

Cause:

The auto-generated indexes for the corresponding unique key in Oracle Database 11g are not dropped. Even after you run the drop constraint on the unique key, the corresponding index is not dropped.

Solution:

To resolve this issue, perform the following steps:

1. Run the following SQL commands:
   ```
   DELETE FROM ARRFINSTANCES;
   DELETE FROM ARRFPROTOCOLREGISTRY WHERE INSTANCEID <> 'DEFAULTID';
   ALTER TABLE ARRFPROTOCOLREGISTRY DROP CONSTRAINT
   UN_ARPROTOCOLREGISTRY CASCADE;
   COMMIT;
   ```
2. Verify whether the index has been dropped by running the following command:
   ```
   Select * from user_indexes where
   index_name='UN_ARPROTOCOLREGISTRY';
   ```
   You should not see any rows returned for the preceding query.
3. Start RiskMinder Server and Case Management Server.