TERADATA

Teradata Database 12.0

Security Target

Version 1.7
August 2009

TRP Number: 541-0006458

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

This section identifies and provides and overview of the Security Target (ST). It also identifies the Target of Evaluation (TOE) and provides an evaluatable claim of Common Criteria (CC) conformance for the TOE.

1.1 SECURITY TARGET REFERENCE

The Security Target (ST) is identified as follows:

Teradata Database 12.0 Security Target
Version 1.7
August 2009

This ST describes the security assumptions, threats, objectives, requirements, and an associated rationale for the Teradata Database and its IT environment. The language used in this Security Target is consistent with the *Common Criteria for Information Technology Security Evaluation, Version 3.1 Revision 2*.

Chapter 1 of this ST provides an introduction, identifying information for the ST and the TOE, and a description of the TOE and guidance on its use. Chapter 2 describes the conformance claims made by the ST. Chapter 3 defines security problem addressed by the TOE in terms of assumptions and threats. Chapter 4 identifies the security objectives of the TOE and of the operational environment. Chapter 5 defines extended components. Chapter 6 describes the TOE security functional requirements and the security assurance requirements. Chapter 7 is the TOE Summary Specification, a description of the functions provided by the Teradata Database to satisfy the security functional and assurance requirements. Appendix A provides a listing of acronyms used throughout the document.

1.2 TOE REFERENCE

The Target of Evaluation (TOE) defined in this ST is identified as follows:

Teradata Database 12.0

The TOE is a product of Teradata Corporation and is referred to as the Teradata Database within this ST.

1.3 TOE OVERVIEW

The product type of the TOE described in this ST is a relational database management system (RDBMS). The TOE provides the capability to limit TOE access to authorized users, enforce

Discretionary Access Controls on objects under the control of the TOE based on user and/or role authorizations, and to provide user accountability via audit of users' actions.

The Teradata Database is designed to access, store, and operate on data using Teradata Structured Query Language (Teradata SQL), which is compatible to ANSI SQL with extensions. The database was developed to allow users to view and manage large amounts of data as a collection of related tables. The Teradata Database includes security functionality for parallel database environments supporting multiple concurrent users. The security functionality includes:

- user management - including identification and authentication
- password management controls
- discretionary access control model to enforce access controls on database objects and resources (e.g., databases, users, tables, views, stored procedures and macros)
- extensive set of access rights
- security roles for management of access rights
- configurable auditing facility

The Teradata Database functions as a database server in a traditional client/server environment. Access requests are made via the Teradata Tools and Utilities that provide connectivity to the database and submit Teradata SQL statements to the database. For any access to the database through its defined external user interfaces, the database ensures that all security enforcement functions are invoked and succeed before any access request is allowed to proceed.

The Teradata Database operates as a parallel application executing as a set of cooperating processes on an underlying host operating system. The host operating system is not part of the TOE but rather part of the supporting operational environment. The operational environment provides several supporting security mechanisms to prevent compromise of the TOE security functions including:

- authentication and authorization of administrator access to database control utilities and other utilities used to manage system resources and I/O interfaces
- isolation of the TOE Security Functions (TSF) to prevent tampering with TSF components (e.g., the TOE processes managing the database)
- network perimeter controls to restrict network access to the database server to mitigate malicious attacks against the operating system upon which the TOE operates

The Teradata Database, as a software TOE, executes on non-TOE hardware and software systems. The major non-TOE hardware and software systems required for use of the TOE include:

- Symmetric multiprocessing (SMP) server with Intel Xeon EM64T processors (minimum 2.33 GHz.) and minimum 6GB of random access memory (RAM) running SUSE Linux Enterprise Server (SLES) 9, 64-bit version

- Massively parallel processing (MPP) server with Intel Xeon EM64T processors (minimum 2.33 GHz.) and minimum 6GB of random access memory (RAM) per node running SUSE Linux Enterprise Server (SLES) 9, 64-bit version

Note: This evaluation is limited to Teradata Database 12.0 running on SUSE Linux Enterprise Server 9, 64 bit version.

The Teradata Database is the only application executing on the server and underlying operating system. Other server applications, such as web server, e-mail server, domain server, directory server, etc. do not run on a Teradata Database server.

1.4 TOE DESCRIPTION

The Teradata Database is comprised of several software subsystems including the Parallel Database Extension (PDE), Gateway for LAN, Session Controller, Parser and Access Module Processors (AMP). A Session Controller and a Parser subsystem are always configured together in what is called a Parsing Engine (PE) virtual processor.

The PDE subsystem is a software interface layer that operates on top of the host operating system and provides an interface between the other database subsystems and the underlying operating system software. PDE includes a BYNET driver that manages the communication devices that interconnect the hardware nodes on which the server software is resident. It provides a standard interface for inter-process communications across nodes in a multi-node environment. PDE also includes a Console module (CNS) that manages the interface for input and output generated from a Database Window (DBW) on the Console.

The Gateway for LAN subsystem provides the client communications interface to Client applications connected via a network interface. It receives all messages sent from the client to the server. This includes messages containing Teradata SQL statements as well as messages for functions such as connecting and disconnecting sessions, determining the configuration of the server, establishing the security protocols to be used between the client and server, and responding to test messages that determine the health of the server over the LAN. For messages that contain Teradata SQL, the Gateway for LAN checks those messages to ensure that they conform to the specified protocol and forwards them to a Parser subsystem. The Gateway for LAN also receives response messages from the PE subsystems and returns them to the appropriate Client application. The Gateway for LAN also interacts with PDE for memory management and message handling services and for access to underlying operating system services.

A PE virtual processor always includes a Session Controller and a Parser subsystem. The Session Controller processes external requests to establish or terminate a logical connection between the application and the server. It also provides for the recovery of sessions following client or server failures. The Session Controller manages session activities, such as logon, password validation and logoff. The Parser decomposes SQL into relational data management processing steps. It processes external requests containing Teradata SQL by syntactically parsing the statements and generating a set of steps comprising an execution plan for the statements. Other Parser modules then access the generated steps and send them to one or more AMP subsystems for execution. Parser modules also monitor the execution of the steps, handle errors encountered during processing and return the execution results to the Gateway for return to the Client application.

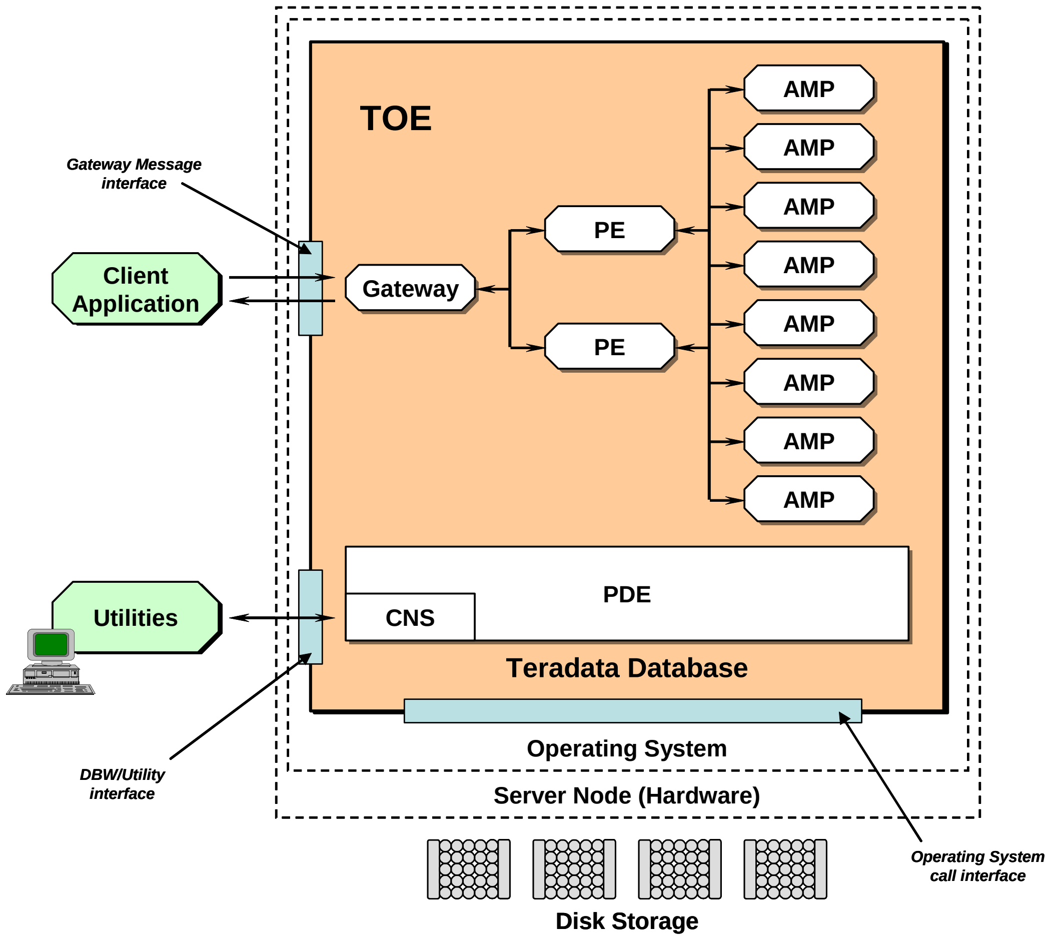
An AMP subsystem physically structures the TOE managed relational data and it processes the steps of an SQL execution plan to access that data. It also manages a set of relational tables containing the description of the user defined data objects. The AMP subsystem provides access to these dictionary tables to Client applications through standard SQL and to other database subsystems as needed and is responsible for the integrity of the relational data structures. The AMP subsystem reads and writes the relational data structures from/to disk storage by making calls to the PDE subsystem which subsequently calls the underlying host operating system to perform the required physical read and write operations.

Other components exist in the Teradata Database environment and interface to the database, but are excluded from the definition of the TOE. These components include:

- The operating system on which the database executes
- The database server node upon which the database software and underlying operating system operates
- The disk storage subsystem and its associated SCSI or Fibre Channel interface.
- The Console's Database Window (DBW) utilities software.
- The Teradata Tools and Utilities (Client) applications including the Call Level Interface (CLI) software that processes messages sent to, and received from, the database.

The physical boundaries of the TOE are depicted in the Figure 1-1.

Figure 1-1 TOE Physical Boundaries



There are two external user interfaces to the Teradata Database. The Gateway Message interface receives service requests from Client applications and returns responses to the applications upon completion of a service request. The DBW/Utility interface provides for Console access to executable processes of the PDE subsystem.

The Gateway Message interface is the primary external user interface to the Teradata Database. The interface processes text messages which are generated by a client process. Messages are simply a string of character data consisting of a header and a body. The header of a message identifies the kind of message and its length along with other general information. The body consists of data structured for the kind of message defined in the header. The predominant kind of message is one in which the body contains a service request consisting of a SQL statement and associated data. The Gateway Message interface is used to process such service requests from both end users and authorized administrators.

The DBW/Utility interface is the external user interface to the Teradata Database PDE subsystem to provide for operational control of the server and for output of operational results of the server's execution. Utilities that use this interface are grouped into the following functional categories:

- Installation, configuration, migration, and upgrade
- System administration and maintenance
- Database administration and operation
- Diagnostics and troubleshooting

Utilities using the DBW/Utility interface do not provide any security functions and do not provide any interface to security functions described in this Security Target.

The Teradata Database makes calls to the underlying operating system to access operating system services and to access the associated disk storage subsystem. There is no direct access from the Teradata Database to the underlying hardware - only the operating system accesses the underling hardware.

Note that the TOE is defined as a software-only TOE. As such, the Server Node (Hardware) and Disk Storage is specifically outside the TOE boundary. (The disk storage resides in a separate disk array cabinet that is packaged completely separately from the Server Node hardware. In some very small environments where the Teradata Database may be running on a standalone server platform, the disk storage may be packaged as part of the server platform.)

The Teradata Database is designed with well-defined interfaces that ensure that all appropriate security checks are made before access is provided to protected database objects and resources. The Teradata Database operates as a set of cooperating processes which are managed by the underlying operating system. These processes operate as a parallel application such that no interference is allowed by processes associated with any non-TOE entities. Furthermore, the Teradata Database is designed such that its interfaces do not allow unauthorized users access to database resources.

Note that given the defined TOE physical boundaries, the TOE protection mechanisms could be bypassed through the underlying operational environment and it is assumed that the operational environment provides appropriate protection mechanisms. The hardware and the operating system upon which the TOE operates both contribute to the enforcement of domain separation between the processes and resources allocated to the TOE and processes and resources that may be allocated to other system functions.

The logical boundaries of the TOE are defined by the supported security functions. All five subsystems of the TOE contribute to meeting the security functional requirements.

TOE Access - The Teradata Database allows an authorized security administrator to restrict access to the database based on user identities, *hostid* associated with a network interface, and network (IP) address of the client system.

Identification and Authentication - The Teradata Database provides user identification and authentication through the use of user accounts and the enforcement of password policies. Users must provide a valid username and password before they can access any database objects or resources. Once identified and authenticated, all subsequent actions allowed within that user's session are based on the user's identity, access rights, and active roles.

Administrator access to database control utilities and other utilities is controlled by a non-TOE component (i.e., the underlying operating system). As such, there is a dependency on the operational environment to provide identification and authentication mechanisms to restrict and control such administrator access.

User Data Protection - The Teradata Database enforces a Discretionary Access Control (DAC) policy for object access based on user identities, object ownership, and active roles. All access to database objects subject to the DAC policy is controlled using access rights. The Teradata Database supports three types of access rights. Implicit rights (ownership rights) are implicitly granted to the immediate owner of a database or database object. Automatic rights are granted automatically by the system to the creator of a database, user, or object, and to a newly created user or database. Explicit rights are granted by any user having the `WITH GRANT OPTION` privilege for that right. The database ensures that the requestor has the appropriate access rights before access to a database object is allowed.

Upon initial installation of the Teradata Database, it has only one user. This user is called user `DBC` and will own all other databases and users in the system. User `DBC` also has access rights on all objects within the database. The administrator guidance recommends that an administrative user be created under user `DBC` and granted access rights for creating and managing other databases and objects. An administrator will log on as that user rather than as user `DBC` to perform normal administrative tasks. Creating an administrative user under user `DBC` is standard practice and provides protection of sensitive data and system objects owned by user `DBC`. Similarly, the administrator guidance also recommends creating a separate security administrator to perform security-related tasks.

Security Audit - The Teradata Database automatically audits all successful and failed user logon attempts in the event log. An authorized security administrator may search and sort logon/logoff records using SQL statements to query a defined system view. Additionally, an authorized security administrator may control the monitoring of access rights checks performed by Teradata Database and may search and sort access log records using SQL statements to query a defined system view.

The time stamp used for recording the date and time on which an event is logged is obtained from a non-TOE component (i.e., the underlying operating system). As such, the TOE has a dependency upon the operational environment to provide a reliable time stamp for use by the security audit functions.

Security Management - The Teradata Database provides security management functions that enable an authorized security administrator to manage the secure operation of the database. These functions include management of users, user security attributes, access rights, security roles, and the audit facilities.

Resource Utilization - The Teradata Database enforces maximum quotas and limits on various resources to ensure that those resources are protected from monopolization by any individual database user. Specifically, an authorized security administrator can configure the database to enforce limits on permanent database space allocation, temporary database space usage, and spool database space usage.

2. CONFORMANCE CLAIMS

2.1 COMMON CRITERIA CONFORMANCE

This ST conforms to the following Common Criteria specifications:

Common Criteria for Information Technology Security Evaluation
Part 2: Security functional components
September 2007
Version 3.1 Revision 2

Common Criteria for Information Technology Security Evaluation
Part 3: Security assurance components
September 2007
Version 3.1 Revision 2

- EAL 4 augmented with ALC_FLR.3

The ST is Common Criteria Part 2 conformant in that all security functional requirements are based only upon functional components in Common Criteria Part 2.

The ST is Common Criteria Part 3 conformant in that all security assurance requirements are based only upon assurance components in Common Criteria Part 3.

2.2 PROTECTION PROFILE CLAIMS

This Security Target does not claim conformance to a Protection Profile.

2.3 PACKAGE CLAIMS

This Security Target does not claim conformance to any functional or assurance packages.

2.4 CONFORMANCE RATIONALE

This Security Target does not claim conformance to a Protection Profile.

3. SECURITY PROBLEM DEFINITION

The security problem addressed by this ST is defined by threats (T), organizational security policies (P), and assumptions (A) as described in the following sections.

3.1 THREATS

This section provides a description of threats to the assets against which specific protection within the TOE or its environment is required.

T.ACCOUNTABILITY	The authorized users of the TOE may not be held accountable for their actions within the TOE.
T.ADMIN_ERROR	An administrator may incorrectly install or configure the TOE resulting in ineffective security mechanisms.
T. AUDIT_ COMPROMISE	A user or process may view audit records, cause audit records to be lost or modified, or prevent future audit records from being recorded, thus masking a user's action.
T.MASQUERADE	A user or process may masquerade as another entity in order to gain unauthorized access to data or TOE resources.
T.POOR_DESIGN	Unintentional errors in requirements specification or design of the TOE may occur, leading to flaws that may be exploited by a casually mischievous user or program.
T.POOR_IMPLEMENTATION	Unintentional errors in implementation of the TOE design may occur, leading to flaws that may be exploited by a casually mischievous user or program.
T.POOR_TEST	Lack of or insufficient tests to demonstrate that all TOE security functions operate correctly (including in a fielded TOE) may result in incorrect TOE behavior being discovered thereby causing potential security vulnerabilities.
T.RESIDUAL_DATA	A user or process may gain unauthorized access to data through reallocation of TOE resources from one user or process to another.

T.RESOURCE	An authenticated database user might consume excessive database resources such that access to database resources by other database users is compromised.
T.NO_SECADMIN	The TOE may not be configured with an authorized security administrator, separate and distinct from other authorized database administrators, to provide for secure administration of the TOE.
T.TSF_COMPROMISE	A malicious user or process may cause configuration data to be inappropriately accessed (viewed, modified or deleted).
T.UNAUTHORIZED_ACCESS	A user may gain unauthorized access to user data for which they are not authorized according to the TOE security policy.
T.UNIDENTIFIED_ACTIONS	Failure of the authorized security administrator to identify and act upon unauthorized actions may occur.

3.2 ORGANIZATIONAL SECURITY POLICIES

This section provides a description of the organizational security policies, i.e., sets of rules, practices, and procedures, imposed by an organization to address its security needs.

P.ACCOUNTABILITY	The authorized users of the TOE shall be held accountable for their actions within the TOE.
P.SECADMIN	The TOE shall be configured with an authorized security administrator user for secure administration of the TOE. This user shall be separate and distinct from other authorized users.

3.3 ASSUMPTIONS

This section provides a description of assumptions that describe the security aspects of the operational environment in which the TOE will be used or is intended to be used.

A.DOMAIN_SEPARATION	The operational environment will provide a separate domain for the TOE’s operation.
A.I_AND_A	It is assumed that the operational environment will provide identification and authentication

	mechanisms for use of utilities under the control of the operational environment.
A.NO_BYPASS	The operational environment will ensure the TSF cannot be bypassed in order to gain access to TOE data.
A.NO_EVIL	Administrators are non-hostile, appropriately trained, and follow all administrator guidance.
A.NO_GENERAL_PURPOSE	There are no general-purpose computing capabilities (e.g., compilers or user applications) available on the database server, other than those services necessary for the operation, administration and support of the database.
A.PHYSICAL	It is assumed that appropriate physical security is provided within the domain for the value of the IT assets protected by the TOE and the value of the stored, processed, and transmitted information.
A.RESTRICT_OS_ACCESS	It is assumed that logon access to the underlying operating system is restricted to authorized administrators only.
A.ROBUST_ENVIRONMENT	It is assumed that the operational environment is at least as robust as the TOE.
A.SECURE_COMMS	It is assumed that the operational environment will provide a secure (protected from disclosure, spoofing, and able to detect modification) line of communications between the remote user and the TOE.
A.TIME_STAMPS	It is assumed that the operational environment will provide the TOE with the necessary reliable timestamps.

4. SECURITY OBJECTIVES

The objectives listed in this section are intended to address all identified assumptions and counter all identified threats. The security objectives for the TOE are prefaced with an 'O' and those for the Environment are prefaced with an 'OE'.

4.1 SECURITY OBJECTIVES FOR THE TOE

O.ADMIN_GUIDANCE	The TOE will provide administrators with the necessary information for secure management.
O.AUDIT_GENERATION	The TOE will provide the capability to detect and create records of security relevant events associated with users.
O.AUDIT_REVIEW	The TOE will contain mechanisms to allow the authorized security administrator to view and sort the audit logs.
O.AUDIT_STORAGE	The TOE will contain mechanisms to provide secure storage and management of the audit log.
O.CONFIG_IDENTIFICATION	The configuration of the TOE is fully identified in a manner that will allow implementation errors to be identified, corrected with the TOE being redistributed promptly.
O.DOCUMENTED_DESIGN	The design of the TOE is adequately and accurately documented.
O.FUNCTIONAL_TEST	The TOE will undergo security functional testing that demonstrates the TSF satisfies its security functional requirements.
O.I_AND_A	The TOE will contain identification and authentication mechanisms for users to login to the TOE.
O.INTERNAL_TOE_DOMAINS	The TSF will maintain internal domains for separation of data and queries belonging to concurrent users.
O.MANAGE	The TOE will provide all the functions and facilities necessary to support the authorized security administrator in management of the security of the TOE, and restrict these functions and facilities from unauthorized use.

O.MEDIATE	The TOE must protect user data in accordance with its security policy.
O.PARTIAL_SELF_PROTECTION	The TSF will maintain a domain for its own execution that protects itself and its resources from external interference, tampering, or unauthorized disclosure through its own interfaces.
O.RESIDUAL_INFORMATION	The TOE will ensure that any information contained in a protected resource within its Scope of Control is not released when the resource is reallocated.
O.RESOURCE	The TOE will provide for limiting the consumption of database resources by authorized users of the TOE.
O.SECADMIN	The TOE will provide for the creation of an authorized security administrator to isolate administrative actions.
O.TOE_ACCESS	The TOE will provide mechanisms that control a user's logical access to the TOE.
O.VULNERABILITY_ANALYSIS	The TOE will undergo some vulnerability analysis to demonstrate the design and implementation of the TOE does not contain any obvious flaws.

4.2 SECURITY OBJECTIVES FOR THE OPERATIONAL ENVIRONMENT

OE.DOMAIN_SEPARATION	The operational environment will provide an isolated domain for the execution of the TOE.
OE_I_AND_A	The operational environment will contain identification and authentication mechanisms for administrator access to database control utilities and other utilities.
OE.NO_BYPASS	The operational environment shall ensure the TOE security mechanisms cannot be bypassed in order to gain access to the TOE resources.
OE.NO_EVIL	Sites using the TOE shall ensure that authorized administrators are non-hostile, appropriately trained and follow all administrator guidance.

OE.CONFIG	The TOE and the underlying operating system will be installed, configured, managed and maintained in accordance with its guidance documentation and applicable security policies and procedures.
OE.NO_GENERAL_ PURPOSE	There will be no general-purpose computing capabilities (e.g., user applications) available on DBMS servers, other than those services necessary for the operation, administration and support of the database.
OE.PHYSICAL	Physical security will be provided within the domain for the value of the IT assets protected by the TOE and the value of the stored, processed, and transmitted information.
OE.RESTRICT_OS_ACCESS	The underlying operating system will be configured with only those user accounts required for access by authorized security administrators.
OE.ROBUST_ENVIRONMENT	The operational environment that supports the TOE for enforcement of its security objectives will be of at least the same level of robustness as the TOE.
OE.SECURE_COMMS	The operational environment will provide a secure line of communications between the remote user and the TOE.
OE.TIME_STAMPS	The operational environment will provide reliable time stamps.
OE.TRUST_IT	Each operational entity the TOE relies on for security functions will be installed, configured, managed and maintained in a manner appropriate to the IT entity, and consistent with the security policy of the TOE and the relationship between them.

4.3 SECURITY OBJECTIVES RATIONALE

This section shows that all secure usage assumptions and threats are completely covered by the security objectives. In addition, each security objective is demonstrated to counter or address at least one assumption or threat.

Table 4-1 Rationale for TOE Security Objectives

Threats/Policies	TOE Security Objectives	Rationale
T.ACCOUNTABILITY	O.AUDIT_GENERATION	O.AUDIT_GENERATION addresses this threat by providing the authorized security administrator with the capability of configuring the audit mechanism to record the actions of a specific user, or review the audit trail based on the identity of the user. Additionally, the security administrator's ID is recorded when any security relevant change is made to the TOE.
	OE.TIME_STAMPS	OE.TIME_STAMPS plays a role in addressing this threat by requiring the IT Environment to provide a reliable time stamp. The audit mechanism is required to include the current date and time in each audit record. All audit records that include the user ID, will also include the date and time that the event occurred.
	O.TOE_ACCESS	O.TOE_ACCESS addresses this threat by requiring the TOE to identify and authenticate all authorized users prior to allowing any TOE access or any TOE mediated access on behalf of those users.
T.ADMIN_ERROR	O.ADMIN_GUIDANCE	O.ADMIN_GUIDANCE helps to mitigate this threat by ensuring the TOE administrators have guidance that instructs them how to administer the TOE in a secure manner. Having this guidance helps to reduce the mistakes that an administrator might make that could cause the TOE to be configured in a way that is insecure.
T.AUDIT_COMPROMISE	O.AUDIT_REVIEW	O.AUDIT_REVIEW ensures that the TOE will provide mechanisms to review the audit logs. These requirements will ensure the data is in a suitable manner for the security administrator to interpret as well as giving the security administrator a way to search and sort within the log to find appropriate data.
	O.AUDIT_STORAGE	O.AUDIT_STORAGE ensures the TOE will provide a secure mechanism for storing and managing the TOE audit log.
	O.MANAGE	O.MANAGE ensures that the TOE will provide all the functions and facilities necessary to support the authorized security administrator in the management of the security of the audit logs, and restrict these functions and facilities from unauthorized use.

Threats/Policies	TOE Security Objectives	Rationale
T.MASQUERADE	O.I_AND_A	O.I_AND_A ensures that the TOE will contain identification and authentication mechanisms for users to login to the TOE.
	O.TOE_ACCESS	O.TOE_ACCESS mitigates this threat by controlling the logical access to the TOE and its resources. By constraining how and when authorized users can access the TOE, and by mandating the type and strength of the authentication mechanism this objective helps mitigate the possibility of a user attempting to login and masquerade as an authorized user. In addition, this objective provides the security administrator the means to control the number of failed login attempts a user can generate before an account is locked out, further reducing the possibility of a user gaining unauthorized access to the TOE.
T.POOR_DESIGN	O.CONFIG_IDENTIFICATION	O.CONFIG_IDENTIFICATION plays a role in countering this threat by requiring the developer to provide control of the changes made to the TOE's design.
	O.DOCUMENTED_DESIGN	O.DOCUMENTED_DESIGN ensures that the design of the TOE is documented, permitting detailed review by evaluators.
	O.VULNERABILITY_ANALYSIS	O.VULNERABILITY_ANALYSIS ensures that the design of the TOE is analyzed for design flaws.
T.POOR.IMPLEMENTATION	O.CONFIG_IDENTIFICATION	O.CONFIG_IDENTIFICATION plays a role in countering this treat by requiring the developer to provide control of the changes made to the TOE's design. Although the previous three objectives help minimize the introduction of errors into the implementation.
	O.FUNCTIONAL_TEST	O.FUNCTIONAL_TEST increases the likelihood that any errors that do exist in the implementation (with respect to the functional specification, high-level, and low-level design) will be discovered through testing.
	O.VULNERABILITY_ANALYSIS	O.VULNERABILITY_ANALYSIS helps reduce errors in the implementation that may not be discovered during functional testing. Ambiguous design documentation and the fact that exhaustive testing of the external interfaces is not required may leave bugs in the implementation undiscovered in functional testing.

Threats/Policies	TOE Security Objectives	Rationale
T.POOR_TEST	O.DOCUMENTED_DESIGN	O.DOCUMENTED_DESIGN helps to ensure that the TOE's documented design satisfies the security functional requirements. In order to ensure the TOE's design is correctly realized in its implementation, the appropriate level of functional testing of the TOE's security mechanisms must be performed during the evaluation of the TOE.
	O.FUNCTIONAL_TEST	O.FUNCTIONAL_TEST increases the likelihood that any errors that do exist in the implementation (with respect to the functional specification, high level, and low-level design) will be discovered through testing.
	O.VULNERABILITY_ANALYSIS	O.VULNERABILITY_ANALYSIS addresses this concern by requiring a vulnerability analysis be performed in conjunction with testing that goes beyond functional testing. This objective provides a measure of confidence that the TOE does not contain security flaws that may not be identified through functional testing. While these testing activities are a necessary activity for successful completion of an evaluation, this testing activity does not address the concern that the TOE continues to operate correctly and enforce its security policies once it has been fielded. Some level of testing must be available to end users to ensure the TOE's security mechanisms continue to operator correctly once the TOE is fielded.
T.RESIDUAL_DATA	O.RESIDUAL_INFORMATION	O.RESIDUAL_INFORMATION counters this threat by ensuring that TSF data and user data is not persistent when resources are released by one user/process and allocated to another user/process.
T.RESOURCE	O.RESOURCE	O.RESOURCE ensures that the TOE provides an authorized security administrator with controls to limit the consumption of database resources by an authorized database user.
T.NO_SECADMIN	O.SECADMIN	The TOE has the objective of providing an authorized security administrator user for secure administration. This is a separate user from other administrative users that the TOE may provide.

Threats/Policies	TOE Security Objectives	Rationale
T.TSF_COMPROMISE	O.RESIDUAL_INFORMATION	O.RESIDUAL_INFORMATION is necessary to mitigate this threat, because even if the security mechanisms do not allow a user to explicitly view TSF data, if TSF data were to reside inappropriately in a resource that was made available to a user, that user would be able to view the TSF data without authorization.
	O.PARTIAL_SELF_PROTECTION	O.PARTIAL_SELF_PROTECTION ensures the TOE is capable of protecting itself from attack.
	O.MANAGE	O.MANAGE is necessary because an access control policy is specified to control access to TSF data. This objective is used to dictate who is able to view and modify TSF data, as well as the behavior of TSF functions.
	O.INTERNAL_TOE_DOMAINS	O.INTERNAL_TOE_DOMAINS ensures the TOE will establish separate domains for data belonging to users.
T.UNAUTHORIZED_ACCESS	O.MEDIATE	O.MEDIATE ensures that all accesses to user data are subject to mediation, unless said data has been specifically identifies as public data. The TOE requires successful authentication to the TOE prior to gaining access to any controlled-access content. Lastly, the TSF will ensure that all configured enforcement functions (authentication, access control rules, etc.) must be invoked prior to allowing a user to gain access to TOE or TOE mediated services. The TOE restricts the ability to modify the security attributes associated with access control rules, access to authenticated and unauthenticated services, etc. to the security administrator. This feature ensures that no other user can modify the information flow policy to bypass the intended TOE security policy.
T.UNIDENTIFIED_ACTIONS	O.ADMIN_GUIDANCE	The threat of an authorized security administrator failing to know about malicious audit events produces the O.ADMIN_GUIDANCE objectives of the authorized security administrator having the facilities and knowing how to use them.
	O.MANAGE	The threat of an authorized security administrator failing to know about malicious audit events produces the O.MANAGE objectives of the authorized security administrator having the capability to use the mechanisms to review audit records.

Threats/Policies	TOE Security Objectives	Rationale
P.ACCOUNTABILITY	O.AUDIT_GENERATION	O.AUDIT_GENERATION addresses this policy by providing the authorized security administrator with the capability of configuring the audit mechanism to record the actions of a specific user, or review the audit trail based on the identity of the user. Additionally, the security administrator's ID is recorded when any security relevant change is made to the TOE (e.g., access rule modification, start-stop of the audit mechanism, etc.).
	O.TOE_ACCESS	O.TOE_ACCESS supports this policy by requiring the TOE to identify and authenticate all authorized users prior to allowing any TOE access or any TOE mediated access on behalf of those users.
P.SECADMIN	O.SECADMIN	O. SECADMIN addresses this policy by ensuring that the TOE has been configured with an authorized security administrator user for secure administration. The TOE may provide other administrative users or roles as well, but only the authorized security administrator is required.

Table 4-2 Rationale for Operational Environmental Objectives

Assumptions	Operational Environmental Objectives	Rationale
A.DOMAIN_SEPARATION	OE.DOMAIN_SEPARATION	OE.DOMAIN_SEPARATION ensures the operational environment will provide an isolated domain for the TOE's execution.
A.I_AND_A	OE.I_AND_A	OE.I_AND_A ensures the operational environment will provide mechanisms for administrators to be authenticated before any database control utilities and other utilities used to manage system resources and I/O interfaces may be used.
A.NO_BYPASS	OE.NO_BYPASS	OE.NO_BYPASS ensures the TOE cannot be bypassed in order to gain unauthorized access of TOE resources.
A.NO_EVIL	OE.NO_EVIL	All authorized administrators are trustworthy individuals, having background investigations commensurate with the level of data being protected, have undergone appropriate admin training, and follow all admin guidance.
A.NO_GENERAL_PURPOSE	OE.NO_GENERAL_PURPOSE	The DBMS server must not include any general-purpose computing or storage capabilities. This will protect the TSF data from malicious processes.

Assumptions	Operational Environmental Objectives	Rationale
A.PHYSICAL	OE.PHYSICAL	The TOE, the TSF data, and protected user data is assumed to be protected from physical attack (e.g., theft, modification, destruction, or eavesdropping). Physical attack could include unauthorized intruders into the TOE environment, but it does not include physical destructive actions that might be taken by an individual that is authorized to access the TOE environment.
A.RESTRICT_OS_ACCESS	OE.RESTRICT_OS_ACCESS	The underlying operating system running on the DBMS server must include only those user accounts required by authorized administrators. Restricting access to the operating system protects against tampering by malicious users.
A.ROBUST_ENVIRONMENT	OE.ROBUST_ENVIRONMENT	The TOE shall only be installed in an operational environment that is at least as robust as the TOE. The TOE is basic robustness, therefore, all elements in the environment the TOE depends on for enforcement of its security objectives are also assumed to be basic robustness. These elements could include the operating system, encryption devices, and/or boundary protection devices.
	OE.TRUST_IT	The IT entities in the environment are correctly installed, configured, managed and maintained.
A.SECURE_COMMS	OE.SECURE_COMMS	OE.SECURE_COMMS states that the environment must provide a secure line of communication for transfer of TSF data. This is necessary because access to the TOE may be distributed geographically with users and authorized administrators in different locations. The objective OE.SECURE_COMMS does not necessarily mandate that the communications between the remote user or administrator and the TOE be encrypted.
A.TIME_STAMPS	OE.TIME_STAMPS	OE.TIME_STAMPS states that the environment will maintain reliable timestamps and those will be used by the TOE to stamp each audit record with a date and time.

5. EXTENDED COMPONENTS DEFINITION

There are no extended components defined in this Security Target.

6. SECURITY REQUIREMENTS

This section identifies the security functional requirements for the TOE and its' operational environment. In addition, this section also presents the security assurance requirements for the TOE. The operations performed on the security functional and assurance requirements contained in this section adhere to the following conventions:

- Iteration: Allows a component to be used more than once with varying operations. In the ST, a number in parenthesis appended to a component indicates iteration.
- Assignment: Allows the specification of an identified parameter. Assignments are indicated using italicized text and are surrounded by brackets (e.g., [*assignment*]).
- Selection: Allows the specification of one or more elements from a list. Selections are indicated using bold italicized text and are surrounded by brackets (e.g., [***selection***]).
- Refinement: Allows the addition of details. Refinements are indicated using bold text for additions to the requirements (e.g., **refinement**).

All of the security functional requirements are from Common Criteria Part 2 and there are no extended requirements defined in this ST.

6.1 SECURITY FUNCTIONAL REQUIREMENTS

The following table provides a summary of the security functional requirements implemented by the TOE.

Table 6-1 TOE Security Functional Requirements

Security Functional Class	Security Functional Requirement
Security Audit (FAU)	FAU_GEN.1 Audit data generation
	FAU_GEN.2 User identity association
	FAU_SAR.1 Audit review
	FAU_SAR.2 Restricted audit review
	FAU_SAR.3 Selectable audit review
	FAU_SEL.1 Selective audit
	FAU_STG.1 Protected audit trail storage
User Data Protection (FDP)	FDP_ACC.1 Subset access control
	FDP_ACF.1 Security attribute based access control
	FDP_RIP.1 Subset residual information protection
Identification and Authentication (FIA)	FIA_AFL.1 Authentication failure handling
	FIA_ATD.1 User attribute definition
	FIA_SOS.1 Verification of secrets

Security Functional Class	Security Functional Requirement
	FIA_UAU.1 Timing of authentication
	FIA_UID.1 Timing of identification
	FIA_USB.1 User-subject binding
Security Management (FMT)	FMT_MOF.1 Management of security functions behaviour
	FMT_MSA.1 Management of security attributes
	FMT_MSA.3 Static attribute initialization
	FMT_MTD.1 Management of TSF data
	FMT_REV.1 Revocation
	FMT_SMF.1 Specification of management functions
	FMT_SMR.1 Security roles
Resource Utilisation (FRU)	FRU_RSA.1 Maximum quotas
TOE Access (FTA)	FTA_TSE.1 TOE session establishment

The following subsections present the security functional requirements for the TOE.

6.1.1 Class FAU: Security Audit

6.1.1.1 FAU_GEN.1 Audit data generation

Hierarchical to: No other components.

Dependencies: FPT_STM.1 Reliable time stamps

FAU_GEN.1.1 The TSF shall be able to generate an audit record of the following auditable events:

a) Start-up and shutdown of the audit functions;

b) All auditable events for the [***not specified***] level of audit; and

c) [*Events specified in Table 6-2*].

FAU_GEN.1.2 The TSF shall record within each audit record at least the following information:

a) Date and time of the event, type of event, subject identity, and the outcome (success or failure) of the event; and

b) For each audit event type, based on the auditable event definitions of the functional components included in the PP/ST, [*other audit relevant information, as provided under "Additional Data" in Table 6-2*]

Table 6-2 Auditable Events

Component	Event	Additional Data
FAU_SAR.1	Reading of information from the database audit records	None

Component	Event	Additional Data
FAU_SEL.1	All modifications to the database audit configuration that occur while the database audit collection functions are operating	Modified configuration element
FDP_ACF.1	All requests to perform an operation on a database object covered by the SFP	The assigned user access right
FIA_UAU.1	All use of the user authentication mechanism	None
FIA_UID.1	All use of the user identification mechanism, including the user identity provided	None
FIA_USB.1	Success or failure of binding user security attributes to a database subject (e.g., success and failure to create a database subject)	None
FMT_MOF.1	Modifications in the behaviour of the functions of the TSF	Change of threshold for unsuccessful authentication attempts or actions to be taken in the event of an authentication failure
FMT_MSA.1	All modifications of the values of database security attributes	Modification, deletion or addition of database security attributes
FMT_MTD.1	All modifications to the values of TSF data	None
FMT_REV.1	All attempts to revoke database security attributes	None
FMT_SMR.1	Modifications to the group of users that are part of a role	None
FTA_TSE.1	All attempts at establishment of a user session	None

6.1.1.2 FAU_GEN.2 User identity association

Hierarchical to: No other components.

Dependencies: FAU_GEN.1 Audit data generation
FIA_UID.1 Timing of identification

FAU_GEN.2.1 For audit events resulting from actions of identified users, the TSF shall be able to associate each auditable event with the identity of the user that caused the event.

6.1.1.3 FAU_SAR.1 Audit review

Hierarchical to: No other components.

Dependencies: FAU_GEN.1 Audit data generation

FAU_SAR.1.1 The TSF shall provide [*the security administrator*] with the capability to read [*all audit information*] from the audit records.

FAU_SAR.1.2 The TSF shall provide the audit records in a manner suitable for the user to interpret the information.

6.1.1.4 FAU_SAR.2 Restricted audit review

Hierarchical to: No other components.

Dependencies: FAU_SAR.1 Audit review

FAU_SAR.2.1 The TSF shall prohibit all users read access to the audit records, except those users that have been granted explicit read-access.

6.1.1.5 FAU_SAR.3 Selectable audit review

Hierarchical to: No other components.

Dependencies: FAU_SAR.1 Audit review

FAU_SAR.3.1 The TSF shall provide the ability to apply [*searches, sorting*] of audit data based on [*all attributes contained within the audit records*].

6.1.1.6 FAU_SEL.1 Selective audit

Hierarchical to: No other components.

Dependencies: FAU_GEN.1 Audit data generation
FMT_MTD.1 Management of TSF data

FAU_SEL.1.1 The TSF shall be able to select the set of audited events from the set of all auditable events based on the following attributes:

a) [***object identity, user identity, event type***]
b) [*denial of access, frequency of access*].

6.1.1.7 FAU_STG.1 Protected audit trail storage

Hierarchical to: No other components.

Dependencies: FAU_GEN.1 Audit data generation

FAU_STG.1.1 The TSF shall protect the stored audit records in the audit trail from unauthorized deletion **for actions within the TOE Scope of Control**.

FAU_STG.1.2 The TSF shall be able to [***prevent***] unauthorized modifications to the stored audit records in the audit trail **when attempts to modify audit records occur within the TOE Scope of Control**.

6.1.2 Class FDP: User Data Protection

6.1.2.1 FDP_ACC.1 Subset access control

Hierarchical to:	No other components.
Dependencies:	FDP_ACF.1 Security attribute based access control

FDP_ACC.1.1 The TSF shall enforce the [*Discretionary Access Control policy*] on [*all subjects (users), all DBMS-controlled objects (DATABASE, USER, TABLE, VIEW, TRIGGER, MACRO, PROCEDURE, FUNCTION, ROLE, PROFILE) and all operations among them*].

6.1.2.2 FDP_ACF.1 Security attribute based access control

Hierarchical to:	No other components.
Dependencies:	FDP_ACC.1 Subset access control FMT_MSA.3 Static attribute initialization

FDP_ACF.1.1 The TSF shall enforce the [*Discretionary Access Control policy*] to objects based on the following: [*database subject attributes: user identity, active roles; database object attributes: object owner and access rights granted on the object*].

FDP_ACF.1.2 The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: [

a) If the authorized user associated with the subject is the owner of the object, then the requested access is allowed; or

b) If the authorized user associated with the subject has the object access right for the requested access to the object, then the requested access is allowed; or

c) If the authorized user associated with the subject is the member of an active role or nested role which has the object access right for the requested access to the object, then the requested access is allowed; or

d) If `PUBLIC` has the object access right for the requested access to the object, then the requested access is allowed; or

e) Otherwise, the access is denied].

Note: `PUBLIC` is a special internal user provided by the Teradata Database. Access rights granted to `PUBLIC` are applicable to every valid user of the system and all future users of the system.

FDP_ACF.1.3 The TSF shall explicitly authorize access of subjects to objects based on the following additional rules: [*no additional rules*].

FDP_ACF.1.4 The TSF shall explicitly deny access of subjects to objects based on the [*no additional rules*].

6.1.2.3 FDP_RIP.1 Subset residual information protection

Hierarchical to: No other components.

Dependencies: No dependencies

FDP_RIP.1.1 The TSF shall ensure that any previous information content of a resource is made unavailable upon the [***allocation of the resource to***] the following objects: [*database tables*].

6.1.3 Class FIA: Identification and Authentication

6.1.3.1 FIA_AFL.1 Authentication failure handling

Hierarchical to: No other components.

Dependencies: FIA_UAU.1 Timing of authentication

FIA_AFL.1.1 The TSF shall detect when [***a security administrator configurable positive integer within*** [3 - *127*]] unsuccessful authentication attempts occur related to [*the last successful authentication for the indicated user identity*].

FIA_AFL.1.2 When the defined number of unsuccessful authentication attempts has been [***met***], the TSF shall [*disable the account until unlocked by the security administrator or until a configurable number of minutes have elapsed*].

6.1.3.2 FIA_ATD.1 User attribute definition

Hierarchical to: No other components.

Dependencies: No dependencies

FIA_ATD.1.1 The TSF shall maintain the following list of security attributes belonging to individual users: [*database user identifier, authentication data, security roles, profile*].

Note: a profile, if assigned to a database user, may contain user-specific password control attributes.

6.1.3.3 FIA_SOS.1 Verification of secrets

Hierarchical to: No other components.

Dependencies: No dependencies

FIA_SOS.1.1 The TSF shall provide a mechanism to verify that secrets meet [*the following requirements:*

- *Passwords will be restricted to a minimum and maximum number of characters in length,*
- *Passwords will contain a combination of upper and lower case characters,*
- *Passwords will contain at least one numeric character,*
- *Passwords will contain at least one special character,*
- *Passwords will not contain the user's username,*
- *Passwords will be valid for a maximum number of days before expiration,*
- *Previously used passwords may not be re-used for a minimum number of days*].

6.1.3.4 FIA_UAU.1 Timing of authentication

Hierarchical to: No other components.

Dependencies: FIA_UID.1 Timing of identification

FIA_UAU.1.1 The TSF shall allow [*establishment of a virtual circuit for the purpose of transferring authentication information, receipt of error messages upon authentication failure*] on behalf of the user to be performed before the user is authenticated.

FIA_UAU.1.2 The TSF shall require each user to be successfully authenticated before allowing any other TSF-mediated actions on behalf of that user.

6.1.3.5 FIA_UID.1 Timing of identification

Hierarchical to: No other components.

Dependencies: No dependencies

FIA_UID.1.1 The TSF shall allow [*establishment of a virtual circuit for the purpose of transferring identification information, receipt of error messages upon identification failure*] on behalf of the user to be performed before the user is identified.

FIA_UID.1.2 The TSF shall require each user to be successfully identified before allowing any other TSF-mediated actions on behalf of that user.

6.1.3.6 FIA_USB.1 User-subject binding

Hierarchical to: No other components.

Dependencies: FIA_ATD.1 User attribute definition

FIA_USB.1.1 The TSF shall associate the following user security attributes with subjects acting on the behalf of that user: [*user identity and active roles*].

FIA_USB.1.2 The TSF shall enforce the following rules on the initial association of user security attributes with subjects acting on the behalf of users: [*subject security attributes are derived from TSF data maintained for each defined user after a successful login with the defined user identity*].

FIA_USB.1.3 The TSF shall enforce the following rules governing changes to the user security attributes associated with subjects acting on the behalf of users: [*a user can set the active role to any or all roles assigned to them*].

6.1.4 Class FMT: Security Management

6.1.4.1 FMT_MOF.1 Management of security functions behavior

Hierarchical to: No other components.

Dependencies: FMT_SMF.1 Specification of management functions
FMT_SMR.1 Security roles

FMT_MOF.1.1 TSF shall restrict the ability to [***disable and enable***] the functions [*relating to the specification of events to be audited*] to [*the security administrator*].

6.1.4.2 FMT_MSA.1 Management of security attributes

Hierarchical to:	No other components.
Dependencies:	[FDP_ACC.1 Subset access control or FDP_IFC.1 Subset information flow control] FMT_SMF.1 Specification of management functions FMT_SMR.1 Security roles
FMT_MSA.1.1	The TSF shall enforce the [*Discretionary Access Control policy*] to restrict the ability to [***modify, delete,*** [*add, or grant*]] the security attributes [*database object access rights, security roles*] to [*the security administrator or authorized users*].

6.1.4.3 FMT_MSA.3 Static attribute initialization

Hierarchical to:	No other components.
Dependencies:	FMT_MSA.1 Management of security attributes FMT_SMR.1 Security roles
FMT_MSA.3.1	The TSF shall enforce the [*Discretionary Access Control policy*] to provide [***restrictive***] default values for security attributes that are used to enforce the SFP.
FMT_MSA.3.2	The TSF shall allow the [*no identified roles*] to specify alternative initial values to override the default values when an object or information is created.

6.1.4.4 FMT_MTD.1 Management of TSF data

Hierarchical to:	No other components.
Dependencies:	FMT_SMF.1 Specification of management functions FMT_SMR.1 Security roles
FMT_MTD.1.1(1)	The TSF shall restrict the ability to [***change_default, modify, delete,*** [*or add*]] the [*user identities and security roles*] to [*the security administrator*].
FMT_MTD.1.1(2)	The TSF shall restrict the ability to [***change_default, delete,*** [*or add*]] the [*authentication data*] to [*the security administrator*].

FMT_MTD.1.1(3) The TSF shall restrict the ability to [***modify***] the [*authentication data*] to [*the security administrator and users authorized to modify their own authentication data*].

FMT_MTD.1.1(4) The TSF shall restrict the ability to [***change_default, modify, delete, query***] the [*audit rules and audit records*] to [*the security administrator*].

FMT_MTD.1.1(5) The TSF shall restrict the ability to [***change_default, modify, delete***] the [*maximum quotas*] to [*the security administrator*].

6.1.4.5 FMT_REV.1 Revocation

Hierarchical to: No other components.

Dependencies: FMT_SMR.1 Security roles

FMT_REV.1.1 The TSF shall restrict the ability to revoke [*database object access rights*] associated with the [***users, objects***] under the control of the TSF to [*authorized users (only for the database objects they own or database objects for which they have been granted database object access rights allowing them to revoke security attributes)*].

FMT_REV.1.2 The TSF shall enforce the rules [*revocation of database object access rights shall affect all subsequent attempts to access the database object*].

6.1.4.6 FMT_SMF.1 Specification of management functions

Hierarchical to: No other components.

Dependencies: No dependencies

FMT_SMF.1.1 The TSF shall be capable of performing the following management functions: [*beginning and ending the audit function, selection of the audited events, review of audit data, management of database users and authentication data, management of security roles, and management of maximum quotas*].

6.1.4.7 FMT_SMR.1 Security roles

Hierarchical to: No other components.

Dependencies: FIA_UID.1 Timing of identification

FMT_SMR.1.1 The TSF shall maintain the roles [

a) *DBC,*
b) *authorized database administrators,*
c) *authorized security administrator,*
d) *authorized user,*
e) *security roles as defined by an authorized security administrator, and*
f) *users authorized to modify their own authentication data*].

Note: there is a difference in terminology between CC Part 2 and the Teradata Database regarding the use of the word "role" in FMT_SMR.1.1. The first usage (e.g., a), b), c), and d) above), which is part of the CC Part 2 requirement, generally refers to specific database users that are created within the TSF. The second usage (e.g., e) above) specifically refers to the use of Teradata Database security roles that can be created and granted to database users. In this context, a security role is a type of database object that defines a collection of access rights. Security roles are commonly used to manage user access security for groups of users.

FMT_SMR.1.2 The TSF shall be able to associate users with roles.

6.1.5 Class FRU: Resource Utilization

6.1.5.1 FRU_RSA.1 Maximum quotas

Hierarchical to: No other components.

Dependencies: No dependencies

FRU_RSA.1.1 The TSF shall enforce maximum quotas of the following resources: [*permanent database space allocation, temporary database space allocation, and spool database space usage for a specified job*] that [***individual user***] can use [***simultaneously***].

6.1.6 Class FTA: TOE Access

6.1.6.1 FTA_TSE.1 TOE session establishment

Hierarchical to: No other components.

Dependencies: No dependencies

FTA_TSE.1.1 The TSF shall be able to deny session establishment based on [*user identity, hostid, client system network address*].

6.2 SECURITY ASSURANCE REQUIREMENTS

This section identifies the security assurance requirements that are met by the TOE. These assurance requirements conform to the CC Part 3 requirements for EAL4 augmented with ALC_FLR.3 and are identified in the following table.

Table 6-3 TOE Security Assurance Requirements

Security Assurance Class	Security Assurance Component
ASE: Security Target evaluation	ASE_INT.1 ST introduction
	ASE_CCL.1 Conformance claims
	ASE_SPD.1 Security problem definition
	ASE_OBJ.2 Security objectives
	ASE_ECD.1 Extended components definition
	ASE_REQ.2 Derived security requirements
	ASE_TSS.1 TOE summary specification
ADV: Development	ADV_ARC.1 Security architecture description
	ADV_FSP.4 Complete functional specification
	ADV_IMP.1 Implementation representation of the TSF
	ADV_TDS.3 Basic modular design
AGD: Guidance documents	AGD_OPE.1 Operational user guidance
	AGD_PRE.1 Preparative procedures
ALC: Life cycle support	ALC_CMC.4 Production support, acceptance procedures and automation
	ALC_CMS.4 Problem tracking CM coverage
	ALC_DEL.1 Delivery procedures
	ALC_DVS.1 Identification of security measures
	ALC_FLR.3 Systematic flaw remediation
	ALC_LCD.1 Developer defined life-cycle model
	ALC_TAT.1 Well-defined development tools
ATE: Tests	ATE_COV.2 Analysis of coverage
	ATE_DPT.2 Testing: security enforcing modules
	ATE_FUN.1 Functional testing
	ATE_IND.2 Independent testing – sample
AVA: Vulnerability assessment	AVA_VAN.3 Focused vulnerability analysis

The following subsections present the security assurance requirements for the TOE.

6.2.1 Class ASE: Security Target evaluation

6.2.1.1 ASE_INT.1 ST introduction

Dependencies: No dependencies.

ASE_INT.1.1D The developer shall provide an ST introduction.

ASE_INT.1.1C	The ST introduction shall contain an ST reference, a TOE reference, a TOE overview and a TOE description.
ASE_INT.1.2C	The ST reference shall uniquely identify the ST.
ASE_INT.1.3C	The TOE reference shall identify the TOE.
ASE_INT.1.4C	The TOE overview shall summarize the usage and major security features of the TOE.
ASE_INT.1.5C	The TOE overview shall identify the TOE type.
ASE_INT.1.6C	The TOE overview shall identify any non-TOE hardware/software/firmware required by the TOE.
ASE_INT.1.7C	The TOE description shall describe the physical scope of the TOE.
ASE_INT.1.8C	The TOE description shall describe the logical scope of the TOE.
ASE_INT.1.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.
ASE_INT.1.2E	The evaluator shall confirm that the TOE reference, the TOE overview, and the TOE description are consistent with each other.

6.2.1.2 ASE_CCL.1 Conformance claims

Dependencies:	ASE_INT.1 ST introduction ASE_ECD.1 Extended components definition ASE_REQ.1 Stated security requirements
ASE_CCL.1.1D	The developer shall provide a conformance claim.
ASE_CCL.1.2D	The developer shall provide a conformance claim rationale.
ASE_CCL.1.1C	The conformance claim shall contain a CC conformance claim that identifies the version of the CC to which the ST and the TOE claim conformance.
ASE_CCL.1.2C	The CC conformance claim shall describe the conformance of the ST to CC Part 2 as either CC Part 2 conformant or CC Part 2 extended.
ASE_CCL.1.3C	The CC conformance claim shall describe the conformance of the ST to CC Part 3 as either CC Part 3 conformant or CC Part 3 extended.
ASE_CCL.1.4C	The CC conformance claim shall be consistent with the extended components definition.

ASE_CCL.1.5C	The conformance claim shall identify all PPs and security requirement packages to which the ST claims conformance.
ASE_CCL.1.6C	The conformance claim shall describe any conformance of the ST to a package as either package-conformant or package-augmented.
ASE_CCL.1.7C	The conformance claim rationale shall demonstrate that the TOE type is consistent with the TOE type in the PPs for which conformance is being claimed.
ASE_CCL.1.8C	The conformance claim rationale shall demonstrate that the statement of the security problem definition is consistent with the statement of the security problem definition in the PPs for which conformance is being claimed.
ASE_CCL.1.9C	The conformance claim rationale shall demonstrate that the statement of security objectives is consistent with the statement of security objectives in the PPs for which conformance is being claimed.
ASE_CCL.1.10C	The conformance claim rationale shall demonstrate that the statement of security requirements is consistent with the statement of security requirements in the PPs for which conformance is being claimed.
ASE_CCL.1.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.1.3 ASE_SPD.1 Security problem definition

Dependencies:	No dependencies.
ASE_SPD.1.1D	The developer shall provide a security problem definition.
ASE_SPD.1.1C	The security problem definition shall describe the threats.
ASE_SPD.1.2C	All threats shall be described in terms of a threat agent, an asset, and an adverse action.
ASE_SPD.1.3C	The security problem definition shall describe the OSPs.
ASE_SPD.1.4C	The security problem definition shall describe the assumptions about the operational environment of the TOE.
ASE_SPD.1.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.1.4 ASE_OBJ.2 Security objectives

Dependencies:	ASE_SPD.1 Security problem definition
ASE_OBJ.2.1D	The developer shall provide a statement of security objectives.
ASE_OBJ.2.2D	The developer shall provide a security objectives rationale.
ASE_OBJ.2.1C	The statement of security objectives shall describe the security objectives for the TOE and the security objectives for the operational environment.
ASE_OBJ.2.2C	The security objectives rationale shall trace each security objective for the TOE back to threats countered by that security objective and OSPs enforced by that security objective.
ASE_OBJ.2.3C	The security objectives rationale shall trace each security objective for the operational environment back to threats countered by that security objective, OSPs enforced by that security objective, and assumptions upheld by that security objective.
ASE_OBJ.2.4C	The security objectives rationale shall demonstrate that the security objectives counter all threats.
ASE_OBJ.2.5C	The security objectives rationale shall demonstrate that the security objectives enforce all OSPs.
ASE_OBJ.2.6C	The security objectives rationale shall demonstrate that the security objectives for the operational environment uphold all assumptions.
ASE_OBJ.2.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.1.5 ASE_ECD.1 Extended components definition

Dependencies:	No dependencies.
ASE_ECD.1.1D	The developer shall provide a statement of security requirements.
ASE_ECD.1.2D	The developer shall provide an extended components definition.
ASE_ECD.1.1C	The statement of security requirements shall identify all extended security requirements.
ASE_ECD.1.2C	The extended components definition shall define an extended component for each extended security requirement.

ASE_ECD.1.3C The extended components definition shall describe how each extended component is related to the existing CC components, families, and classes.

ASE_ECD.1.4C The extended components definition shall use the existing CC components, families, classes, and methodology as a model for presentation.

ASE_ECD.1.5C The extended components shall consist of measurable and objective elements such that conformance or nonconformance to these elements can be demonstrated.

ASE_ECD.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ASE_ECD.1.2E The evaluator shall confirm that no extended component can be clearly expressed using existing components.

6.2.1.6 ASE_REQ.2 Derived security requirements

Dependencies: ASE_OBJ.2 Security objectives
ASE_ECD.1 Extended components definition

ASE_REQ.2.1D The developer shall provide a statement of security requirements.

ASE_REQ.2.2D The developer shall provide a security requirements rationale.

ASE_REQ.2.1C The statement of security requirements shall describe the SFRs and the SARs.

ASE_REQ.2.2C All subjects, objects, operations, security attributes, external entities and other terms that are used in the SFRs and the SARs shall be defined.

ASE_REQ.2.3C The statement of security requirements shall identify all operations on the security requirements.

ASE_REQ.2.4C All operations shall be performed correctly.

ASE_REQ.2.5C Each dependency of the security requirements shall either be satisfied, or the security requirements rationale shall justify the dependency not being satisfied.

ASE_REQ.2.6C The security requirements rationale shall trace each SFR back to the security objectives for the TOE.

ASE_REQ.2.7C The security requirements rationale shall demonstrate that the SFRs meet all security objectives for the TOE.

ASE_REQ.2.8C	The security requirements rationale shall explain why the SARs were chosen.
ASE_REQ.2.9C	The statement of security requirements shall be internally consistent.
ASE_REQ.2.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.1.7 ASE_TSS.1 TOE summary specification

Dependencies:	ASE_INT.1 ST introduction ASE_REQ.1 Stated security requirements ADV_FSP.1 Basic functional specification
ASE_TSS.1.1D	The developer shall provide a TOE summary specification.
ASE_TSS.1.1C	The TOE summary specification shall describe how the TOE meets each SFR.
ASE_TSS.1.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.
ASE_TSS.1.2E	The evaluator shall confirm that the TOE summary specification is consistent with the TOE overview and the TOE description.

6.2.2 Class ADV: Development

6.2.2.1 ADV_ARC.1 Security architecture description

Dependencies:	ADV_FSP.1 Basic functional specification ADV_TDS.1 Basic design
ADV_ARC.1.1D	The developer shall design and implement the TOE so that the security features of the TSF cannot be bypassed.
ADV_ARC.1.2D	The developer shall design and implement the TSF so that it is able to protect itself from tampering by untrusted active entities.
ADV_ARC.1.3D	The developer shall provide a security architecture description of the TSF.
ADV_ARC.1.1C	The security architecture description shall be at a level of detail commensurate with the description of the SFR-enforcing abstractions described in the TOE design document.

ADV_ARC.1.2C	The security architecture description shall describe the security domains maintained by the TSF consistently with the SFRs.
ADV_ARC.1.3C	The security architecture description shall describe how the TSF initialization process is secure.
ADV_ARC.1.4C	The security architecture description shall demonstrate that the TSF protects itself from tampering.
ADV_ARC.1.5C	The security architecture description shall demonstrate that the TSF prevents bypass of the SFR-enforcing functionality.
ADV_ARC.1.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.2.2 ADV_FSP.4 Complete functional specification

Dependencies:	ADV_TDS.1 Basic design
ADV_FSP.4.1D	The developer shall provide a functional specification.
ADV_FSP.4.2D	The developer shall provide a tracing from the functional specification to the SFRs.
ADV_FSP.4.1C	The functional specification shall completely represent the TSF.
ADV_FSP.4.2C	The functional specification shall describe the purpose and method of use for all TSFI.
ADV_FSP.4.3C	The functional specification shall identify and describe all parameters associated with each TSFI.
ADV_FSP.4.4C	The functional specification shall describe all actions associated with each TSFI.
ADV_FSP.4.5C	The functional specification shall describe all direct error messages that may result from an invocation of each TSFI.
ADV_FSP.4.6C	The tracing shall demonstrate that the SFRs trace to TSFIs in the functional specification.
ADV_FSP.4.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.
ADV_FSP.4.2E	The evaluator shall determine that the functional specification is an accurate and complete instantiation of the SFRs.

6.2.2.3 ADV_IMP.1 Implementation representation of the TSF

Dependencies:	ADV_TDS.3 Basic modular design ALC_TAT.1 Well-defined development tools
ADV_IMP.1.1D	The developer shall make available the implementation representation for the entire TSF.
ADV_IMP.1.2D	The developer shall provide a mapping between the TOE design description and the sample of the implementation representation.
ADV_IMP.1.1C	The implementation representation shall define the TSF to a level of detail such that the TSF can be generated without further design decisions.
ADV_IMP.1.2C	The implementation representation shall be in the form used by the development personnel.
ADV_IMP.1.3C	The mapping between the TOE design description and the sample of the implementation representation shall demonstrate their correspondence.
ADV_IMP.1.1E	The evaluator shall confirm that, for the selected sample of the implementation representation, the information provided meets all requirements for content and presentation of evidence.

6.2.2.4 ADV_TDS.3 Basic modular design

Dependencies:	ADV_FSP.4 Complete functional specification
ADV_TDS.3.1D	The developer shall provide the design of the TOE.
ADV_TDS.3.2D	The developer shall provide a mapping from the TSFI of the functional specification to the lowest level of decomposition available in the TOE design.
ADV_TDS.3.1C	The design shall describe the structure of the TOE in terms of subsystems.
ADV_TDS.3.2C	The design shall describe the TSF in terms of modules.
ADV_TDS.3.3C	The design shall identify all subsystems of the TSF.
ADV_TDS.3.4C	The design shall provide a description of each subsystem of the TSF.
ADV_TDS.3.5C	The design shall provide a description of the interactions among all subsystems of the TSF.

ADV_TDS.3.6C	The design shall provide a mapping from the subsystems of the TSF to the modules of the TSF.
ADV_TDS.3.7C	The design shall describe each SFR-enforcing module in terms of its purpose and interaction with other modules.
ADV_TDS.3.8C	The design shall describe each SFR-enforcing module in terms of its SFR-related interfaces, return values from those interfaces, interaction with and called interfaces to other modules.
ADV_TDS.3.9C	The design shall describe each SFR-supporting or SFR-non-interfering module in terms of its purpose and interaction with other modules.
ADV_TDS.3.10C	The mapping shall demonstrate that all behavior described in the TOE design is mapped to the TSFIs that invoke it.
ADV_TDS.3.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.
ADV_TDS.3.2E	The evaluator shall determine that the design is an accurate and complete instantiation of all security functional requirements.

6.2.3 Class AGD: Guidance documents

6.2.3.1 AGD_OPE.1 Operational user guidance

Dependencies:	ADV_FSP.1 Basic functional specification
AGD_OPE.1.1D	The developer shall provide operational user guidance.
AGD_OPE.1.1C	The operational user guidance shall describe, for each user role, the user-accessible functions and privileges that should be controlled in a secure processing environment, including appropriate warnings.
AGD_OPE.1.2C	The operational user guidance shall describe, for each user role, how to use the available interfaces provided by the TOE in a secure manner.
AGD_OPE.1.3C	The operational user guidance shall describe, for each user role, the available functions and interfaces, in particular all security parameters under the control of the user, indicating secure values as appropriate.
AGD_OPE.1.4C	The operational user guidance shall, for each user role, clearly present each type of security-relevant event relative to the user-accessible functions that need to be performed, including changing the security characteristics of entities under the control of the TSF.

AGD_OPE.1.5C	The operational user guidance shall identify all possible modes of operation of the TOE (including operation following failure or operational error), their consequences and implications for maintaining secure operation.
AGD_OPE.1.6C	The operational user guidance shall, for each user role, describe the security measures to be followed in order to fulfill the security objectives for the operational environment as described in the ST.
AGD_OPE.1.7C	The operational user guidance shall be clear and reasonable.
AGD_OPE.1.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.3.2 AGD_PRE.1 Preparative procedures

Dependencies:	No dependencies.
AGD_PRE.1.1D	The developer shall provide the TOE including its preparative procedures.
AGD_PRE.1.1C	The preparative procedures shall describe all the steps necessary for secure acceptance of the delivered TOE in accordance with the developer's delivery procedures.
AGD_PRE.1.2C	The preparative procedures shall describe all the steps necessary for secure installation of the TOE and for the secure preparation of the operational environment in accordance with the security objectives for the operational environment as described in the ST.
AGD_PRE.1.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.
AGD_PRE.1.2E	The evaluator shall apply the preparative procedures to confirm that the TOE can be prepared securely for operation.

6.2.4 Class ALC: Life cycle support

6.2.4.1 ALC_CMC.4 Production, support, acceptance procedures and automation

Dependencies:	ALC_CMS.1 TOE CM coverage ALC_DVS.1 Identification of security measures ALC_LCD.1 Developer defined life-cycle model
ALC_CMC.4.1D	The developer shall provide the TOE and a reference for the TOE.

ALC_CMC.4.2D	The developer shall provide the CM documentation.
ALC_CMC.4.3D	The developer shall use a CM system.
ALC_CMC.4.1C	The TOE shall be labeled with its unique reference.
ALC_CMC.4.2C	The CM documentation shall describe the method used to uniquely identify the configuration items.
ALC_CMC.4.3C	The CM system shall uniquely identify all configuration items.
ALC_CMC.4.4C	The CM system shall provide automated measures such that only authorized changes are made to the configuration items.
ALC_CMC.4.5C	The CM system shall support the production of the TOE by automated means.
ALC_CMC.4.6C	The CM documentation shall include a CM plan.
ALC_CMC.4.7C	The CM plan shall describe how the CM system is used for the development of the TOE.
ALC_CMC.4.8C	The CM plan shall describe the procedures used to accept modified or newly created configuration items as part of the TOE.
ALC_CMC.4.9C	The evidence shall demonstrate that all configuration items are being maintained under the CM system.
ALC_CMC.4.10C	The evidence shall demonstrate that the CM system is being operated in accordance with the CM plan.
ALC_CMC.4.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.4.2 ALC_CMS.4 Problem tracking CM coverage

Dependencies:	No dependencies.
ALC_CMS.4.1D	The developer shall provide a configuration list for the TOE.
ALC_CMS.4.1C	The configuration list shall include the following: the TOE itself; the evaluation evidence required by the SARs; the parts that comprise the TOE; the implementation representation; and security flaw reports and resolution status.
ALC_CMS.4.2C	The configuration list shall uniquely identify the configuration items.

ALC_CMS.4.3C	For each TSF relevant configuration item, the configuration list shall indicate the developer of the item.
ALC_CMS.4.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.4.3 ALC_DEL.1 Delivery procedures

Dependencies:	No dependencies.
ALC_DEL.1.1D	The developer shall document procedures for delivery of the TOE or parts of it to the consumer.
ALC_DEL.1.2D	The developer shall use the delivery procedures.
ALC_DEL.1.1C	The delivery documentation shall describe all procedures that are necessary to maintain security when distributing versions of the TOE to the consumer.
ALC_DEL.1.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.4.4 ALC_DVS.1 Identification of security measures

Dependencies:	No dependencies.
ALC_DVS.1.1D	The developer shall produce development security documentation.
ALC_DVS.1.1C	The development security documentation shall describe all the physical, procedural, personnel, and other security measures that are necessary to protect the confidentiality and integrity of the TOE design and implementation in its development environment.
ALC_DVS.1.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.
ALC_DVS.1.2E	The evaluator shall confirm that the security measures are being applied.

6.2.4.5 ALC_FLR.3 Systematic flaw remediation

Dependencies:	No dependencies.
ALC_FLR.3.1D	The developer shall document flaw remediation procedures addressed to TOE developers.

ALC_FLR.3.2D	The developer shall establish a procedure for accepting and acting upon all reports of security flaws and requests for corrections to those flaws.
ALC_FLR.3.3D	The developer shall provide flaw remediation guidance addressed to TOE users.
ALC_FLR.3.1C	The flaw remediation procedures documentation shall describe the procedures used to track all reported security flaws in each release of the TOE.
ALC_FLR.3.2C	The flaw remediation procedures shall require that a description of the nature and effect of each security flaw be provided, as well as the status of finding a correction to that flaw.
ALC_FLR.3.3C	The flaw remediation procedures shall require that corrective actions be identified for each of the security flaws.
ALC_FLR.3.4C	The flaw remediation procedures documentation shall describe the methods used to provide flaw information, corrections and guidance on corrective actions to TOE users.
ALC_FLR.3.5C	The flaw remediation procedures shall describe a means by which the developer receives from TOE users reports and enquiries of suspected security flaws in the TOE.
ALC_FLR.3.6C	The flaw remediation procedures shall include a procedure requiring timely response and the automatic distribution of security flaw reports and the associated corrections to registered users who might be affected by the security flaw.
ALC_FLR.3.7C	The procedures for processing reported security flaws shall ensure that any reported flaws are remediated and the remediation procedures issued to TOE users.
ALC_FLR.3.8C	The procedures for processing reported security flaws shall provide safeguards that any corrections to these security flaws do not introduce any new flaws.
ALC_FLR.3.9C	The flaw remediation guidance shall describe a means by which TOE users report to the developer any suspected security flaws in the TOE.
ALC_FLR.3.10C	The flaw remediation guidance shall describe a means by which TOE users may register with the developer, to be eligible to receive security flaw reports and corrections.
ALC_FLR.3.11C	The flaw remediation guidance shall identify the specific points of contact for all reports and enquiries about security issues involving the TOE.

ALC_FLR.3.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.4.6 ALC_LCD.1 Developer defined life-cycle model

Dependencies: No dependencies.

ALC_LCD.1.1D The developer shall establish a life-cycle model to be used in the development and maintenance of the TOE.

ALC_LCD.1.2D The developer shall provide life-cycle definition documentation.

ALC_LCD.1.1C The life-cycle definition documentation shall describe the model used to develop and maintain the TOE.

ALC_LCD.1.2C The life-cycle model shall provide for the necessary control over the development and maintenance of the TOE.

ALC_LCD.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.4.7 ALC_TAT.1 Well-defined development tools

Dependencies: ADV_IMP.1 Implementation representation of the TSF

ALC_TAT.1.1D The developer shall identify each development tool being used for the TOE.

ALC_TAT.1.2D The developer shall document the selected implementation-dependent options of each development tool.

ALC_TAT.1.1C Each development tool used for implementation shall be well-defined.

ALC_TAT.1.2C The documentation of each development tool shall unambiguously define the meaning of all statements as well as all conventions and directives used in the implementation.

ALC_TAT.1.3C The documentation of each development tool shall unambiguously define the meaning of all implementation-dependent options.

ALC_TAT.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.5 Class ATE: Tests

6.2.5.1 ATE_COV.2 Analysis of coverage

Dependencies:	ADV_FSP.2 Security-enforcing functional specification ATE_FUN.1 Functional testing
ATE_COV.2.1D	The developer shall provide an analysis of the test coverage.
ATE_COV.2.1C	The analysis of the test coverage shall demonstrate the correspondence between the tests identified in the test documentation and the TSFIs in the functional specification.
ATE_COV.2.2C	The analysis of the test coverage shall demonstrate that all TSFIs in the functional specification have been tested.
ATE_COV.2.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.5.2 ATE_DPT.2 Testing: security enforcing modules

Dependencies:	ADV_ARC.1 Security architecture description ADV_TDS.3 Basic modular design ATE_FUN.1 Functional testing
ATE_DPT.2.1D	The developer shall provide the analysis of the depth of testing.
ATE_DPT.2.1C	The analysis of the depth of testing shall demonstrate the correspondence between the tests in the test documentation and the TSF subsystems and SFR-enforcing modules in the TOE design.
ATE_DPT.2.2C	The analysis of the depth of testing shall demonstrate that all TSF subsystems in the TOE design have been tested.
ATE_DPT.2.3C	The analysis of the depth of testing shall demonstrate that the SFR-enforcing modules in the TOE design have been tested.
ATE_DPT.2.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.5.3 ATE_FUN.1 Functional testing

Dependencies:	ATE_COV.1 Evidence of coverage
ATE_FUN.1.1D	The developer shall test the TSF and document the results.

ATE_FUN.1.2D	The developer shall provide test documentation.
ATE_FUN.1.1C	The test documentation shall consist of test plans, expected test results and actual test results.
ATE_FUN.1.2C	The test plans shall identify the tests to be performed and describe the scenarios for performing each test. These scenarios shall include any ordering dependencies on the results of other tests.
ATE_FUN.1.3C	The expected test results shall show the anticipated outputs from a successful execution of the tests.
ATE_FUN.1.4C	The actual test results shall be consistent with the expected test results.
ATE_FUN.1.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

6.2.5.4 ATE_IND.2 Independent testing - sample

Dependencies:	ADV_FSP.2 Security-enforcing functional specification AGD_OPE.1 Operational user guidance AGD_PRE.1 Preparative procedures ATE_COV.1 Evidence of coverage ATE_FUN.1 Functional testing
ATE_IND.2.1D	The developer shall provide the TOE for testing.
ATE_IND.2.1C	The TOE shall be suitable for testing.
ATE_IND.2.2C	The developer shall provide an equivalent set of resources to those that were used in the developer's functional testing of the TSF.
ATE_IND.2.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.
ATE_IND.2.2E	The evaluator shall execute a sample of tests in the test documentation to verify the developer test results.
ATE_IND.2.3E	The evaluator shall test a subset of the TSF to confirm that the TSF operates as specified.

6.2.6 Class AVA: Vulnerability assessment

6.2.6.1 AVA_VAN.3 Focused vulnerability analysis

Dependencies:	ADV_ARC.1 Security architecture description ADV_FSP.2 Security-enforcing functional specification ADV_TDS.3 Basic modular design ADV_IMP.1 Implementation representation of the TSF AGD_OPE.1 Operational user guidance AGD_PRE.1 Preparative procedures
AVA_VAN.3.1D	The developer shall provide the TOE for testing.
AVA_VAN.3.1C	The TOE shall be suitable for testing.
AVA_VAN.3.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.
AVA_VAN.3.2E	The evaluator shall perform a search of public domain sources to identify potential vulnerabilities in the TOE.
AVA_VAN.3.3E	The evaluator shall perform an independent vulnerability analysis of the TOE using the guidance documentation, functional specification, TOE design, security architecture description and implementation representation to identify potential vulnerabilities in the TOE.
AVA_VAN.3.4E	The evaluator shall conduct penetration testing, based on the identified potential vulnerabilities, to determine that the TOE is resistant to attacks performed by an attacker possessing Enhanced-Basic attack potential.

6.3 SECURITY REQUIREMENTS RATIONALE

Table 6-4 demonstrates the mapping of Security Requirements to TOE Security Objectives. Rationale for each mapping is included in the table.

Table 6-4 Rationale for TOE Security Requirements

Security Objective	Security Requirements	Rationale
O.ADMIN_GUIDANCE	ALC_DEL.1	ALC_DEL.1 ensures that the administrator is provided documentation that instructs them how to ensure the delivery of the TOE, in whole or in parts, has not been tampered with or corrupted during delivery.

Security Objective	Security Requirements	Rationale
O.ADMIN_GUIDANCE *(continued)*	AGD_OPE.1	AGD_OPE.1 mandates the developer provide the security administrator with guidance on how to operate the TOE in a secure manner. This includes describing the interfaces the security administrator uses in managing the TOE, security parameters that are configurable by the security administrator, how to configure the TOE's rule set and the implications of any dependencies of individual rules. The documentation also provides a description of how to setup and review the auditing features of the TOE. AGD_OPE.1 is also intended for non-administrative users on that it could be used to provide guidance on security that is common to both administrators and non-administrators.
	AGD_PRE.1	AGD_PRE.1 ensures the administrator has the information necessary to install the TOE in the evaluated configuration. Often times a vendor's product contains software that is not part of the TOE and has not been evaluated. The Preparative User Guidance (AGD_PRE) documentation ensures that once the administrator has followed the installation and configuration guidance the result is a TOE in a secure configuration. AGD_OPE.1 and AGD_PRE.1 analysis during evaluation will ensure that the guidance documentation is complete and consistent, and notes all requirements for external security measures.
O.AUDIT_GENERATION	FAU_GEN.1	FAU_GEN.1 defines the set of events that the TOE must be capable of recording. This requirement ensures that the security administrator has the ability to audit any security relevant events that takes place in the TOE. This requirement also defines the information that must be contained in the audit record for each auditable event.
	FAU_GEN.2	FAU_GEN.2 ensures that the audit records associate a user identity with the auditable event. In the case of authorized users, the association is accomplished with the userid.
	FAU_SEL.1	FAU_SEL.1 allows the security administrator to configure which auditable events will be recorded in the audit trail. This provides the security administrator with the flexibility in recording only those events that are deemed necessary by site policy, thus reducing the amount of resources consumed by the audit mechanism.
	FIA_USB.1	FIA_USB.1 requires that all subjects that act on behalf of users must have a binding that associates the subjects with a user. This is necessary to be able to associate audit records with user identities.

Security Objective	Security Requirements	Rationale
O.AUDIT_REVIEW	FAU_SAR.1	FAU_SAR.1 requires that only the authorized security administrator has the capability to read the audit records which must be presented in a manner suitable for the security administrator to interpret them.
	FAU_SAR.2	FAU_SAR.2 prohibits all other users read access of the audit records.
	FAU_SAR.3	FAU_SAR.3 requires the TOE to provide a mechanism for the security administrator to search and sort through the audit records.
O.AUDIT_STORAGE	FAU_STG.1	FAU_STG.1 requires that only the authorized security administrator may delete the audit records ensuring that no malicious users may compromise the data stored within the audit records.
	FMT_MTD.1	FMT_MTD.1 allows only the authorized security administrator to query the logs and clear the logs.
	FMT_SMF.1	FMT_SMF.1 lists the mechanisms available to the security administrator for managing the audit records.
O.CONFIG_IDENTIFICATION	ALC_CMS.4	ALC_CMS.4 addresses this objective by requiring that there be a unique reference for the TOE, and that the TOE is labelled with that reference. It also requires that there be a CM system in place, and that the configuration items that comprise the TOE are uniquely identified. This provides a clear identification of the composition of the TOE.
	ALC_FLR.3	ALC_FLR.3 addresses this objective by requiring that there be a mechanism in place for identifying flaws subsequent to fielding, and for distributing those flaws to entities operating the system.
O.DOCUMENTED_DESIGN	ADV_FSP.2	ADV_FSP.2 requires that the interfaces to the TOE be documented and specified.
	ADV_TDS.3	ADV_TDS.3 requires the high level design of the TOE be documented and specified and that said design be shown to correspond to the interfaces. ADV_TDS.3 also requires that there be a correspondence between adjacent layers of the design decomposition.

Security Objective	Security Requirements	Rationale
O.FUNCTIONAL_TEST	ATE_COV.2	ATE_COV.2 requires that there be a correspondence between the tests in the test documentation and the TSF as described in the functional specification.
	ATE_FUN.1	ATE_FUN.1 requires that the developer provide test documentation for the TOE, including test plans, test procedure descriptions, expected test results, and actual test results. These need to identify the functions tested, the tests performed, and test scenarios. There require that the developer run those tests, and show that the expected results were achieved.
	ATE_IND.2	ATE_IND.2 requires that the evaluators test a subset of the TSF to confirm correct operation, on an equivalent set of resources to those used by the developer for testing. These sets should include a subset of the developer run tests.
O.I_AND_A	FIA_AFL.1	FIA_AFL.1 requires the TOE to provide a mechanism for the security administrator to restrict the number of unsuccessful authentication attempts allowed before a user account is locked.
	FIA_ATD.1	FIA_ATD.1 requires the TOE to maintain user identities and passwords belonging to individual users.
	FIA_SOS.1	FIA_SOS.1 requires the TOE to enforce rules requiring the construction of strong passwords and to prevent brute-force password attacks.
	FIA_UAU.1 FIA_UID.1	FIA_UAU.1 and FIA_UID.1 require the TOE to successfully identify and authenticate a user before establishing a session on behalf of the user.
	FIA_USB.1	FIA_USB.1 requires that all subjects that act on behalf of users must have a binding that associates the subjects with a user uniquely.
O.INTERNAL_TOE_DOMAINS	ADV_ARC.1	ADV_ARC.1 provides the security architecture description of the security domains maintained by the TSF that are consistent with the SFRs. Since self-protection is a property of the TSF that is achieved through the design of the TOE and TSF, and enforced by the correct implementation of that design, self-protection will be achieved by that design and implementation.

Security Objective	Security Requirements	Rationale
O.MANAGE	FMT_MOF.1	FMT_MOF.1 requires that the ability to use particular TOE capabilities be restricted to the administrator.
	FMT_MSA.1	FMT_MSA.1 requires that the ability to perform operations on security attributes be restricted to particular roles.
	FMT_MSA.3	FMT_MSA.3 requires that default values used for security attributes are restrictive.
	FMT_MTD.1	FMT_MTD.1 requires that the ability to manipulate TOE content is restricted to administrators.
	FMT_REV.1	FMT_REV.1 restricts the ability to revoke attributes to authorized users.
	FMT_SMF.1	FMT_SMF.1 identifies the management functions that are available to an authorized administrator.
	FMT_SMR.1	FMT_SMR.1 defines the specific security roles to be supported.
O.MEDIATE		The FDP requirements were chosen to define the policies, the subjects, objects, and operations for how and when mediation takes place in the TOE.
	FDP_ACC.1	FDP_ACC.1 defines the Access Control policy that will be enforced on a list of subjects acting on the behalf of users attempting to gain access to a list of named objects. All the operation between subject and object covered are defined by the TOE's policy.
	FDP_ACF.1	FDP_ACF.1 defines the security attribute used to provide access control to objects based on the TOE's access control policy.
O.PARTIAL_SELF_PROTECTION	ADV_ARC.1	ADV_ARC.1 provides the security architecture description of the security domains maintained by the TSF that are consistent with the SFRs. Since self-protection is a property of the TSF that is achieved through the design of the TOE and TSF, and enforced by the correct implementation of that design, self-protection will be achieved by that design and implementation.
O.RESIDUAL_INFORMATION	FDP_RIP.1	FDP_RIP.1 is used to ensure the contents of resources are not available to subjects other than those explicitly granted access to the data.
O.RESOURCE	FRU_RSA.1	FRU_RSA.1 requires that the TOE provide controls to limit the consumption of database resources by authorized database users.
O.SECADMIN	FMT_SMR.1	FMT_SMR.1 requires that the TOE will establish, at least, an authorized security administrator user. The authorized security administrator will be given rights to perform certain tasks that other users will not be able to perform. These rights include, but are not limited to, access to audit information and security functions.

Security Objective	Security Requirements	Rationale
O.TOE_ACCESS	FIA_ATD.1	FIA_ATD.1 defines the attributes of users, including a user ID that is used by the TOE to determine a user's identity and enforce what type of access the user has to the TOE.
	FIA_USB.1	FIA_USB.1 ensures that all subjects that act on behalf of users will have a binding that associates the subjects with a user uniquely.
	FTA_TSE.1	FTA_TSE.1 allows the TOE to restrict access to the TOE based on certain criteria.
O.VULNERABILITY_ANALYSIS	AVA_VAN.3	AVA_VAN.3 provides the necessary level of confidence that vulnerabilities do not exist in the TOE that could cause the security policies to be violated. AVA_VAN.3 requires the evaluator to perform a search for potential vulnerabilities in all the TOE deliverables. For those vulnerabilities that are not eliminated by the developer, a rationale must be provided that describes why these vulnerabilities cannot be exploited by a threat agent with a basic attack potential, which is in keeping with the desired assurance level of this TOE. This component provides the confidence that security flaws do not exist in the TOE that could be exploited by a threat agent of basic attack potential to violate the TOE's security policies.

7. TOE SUMMARY SPECIFICATION

This chapter describes the high-level specification of each TOE Security Function (TSF) that contributes to satisfaction of the SFRs presented in Chapter 6.

7.1 TOE SECURITY FUNCTIONS

Each of the following subsections describes a security function of the Teradata Database. For each security function, details are provided that substantiate how the Teradata Database meets the security function, and ensures that no function can be subverted or bypassed without being traced. At the end of each subsection, the SFRs that are satisfied by the TSF are listed, and when it provides added clarity, short additional details specific to the TSF are provided.

7.1.1 TOE Access

Users are identified using a username. Also, a network interface through which client systems connect to the Teradata Database must have its own unique identifier known as a *hostid*. The database grants logon permission to all users from all *hostid*s by default. However, the authorized security administrator can control which users have access to the database by granting or revoking logons for specific usernames on specific *hostid*s. Therefore, it is possible to deny session establishment based upon user identity and *hostid*.

The Teradata Database also supports a feature to restrict logons by network (IP) address. The authorized security administrator may configure a set of IP filters which can be used to allow or deny a user logon based upon the network address of the client system from which the user is initiating the logon.

The TOE Access function satisfies the following security functional requirements:

- FTA_TSE.1 TOE session establishment – The TOE satisfies this requirement by allowing the establishment of a session to be denied based upon the user's identity, *hostid,* and client system network address.

7.1.2 Identification and Authentication

When a user attempts to logon to the Teradata Database, a virtual circuit is established to facilitate the transfer of identification and authentication information between the client and the database and to facilitate the transfer of error messages - such as notification of an expired password or authentication failure - to the client. These are the only TSF-mediated actions performed on behalf of a user prior to the user being identified and authenticated.

The data dictionary maintains a unique set of security attributes for each user including a username and password. Optionally, these security attributes can include a default role and profile.

The Teradata Database provides several configurable controls related to password authentication. The system default password controls are maintained in the data dictionary. Optionally, the authorized security administrator may assign a profile to a user that specifies a different set of password controls. If a user has a profile assigned, then any password controls specified by the profile override the corresponding system default controls. The password management functions provide a Strength of Function level that meets or exceeds *SOF-basic*. The following configurable controls combine to satisfy the requirements regarding passwords:

- The minimum and maximum number of characters required for a valid password
- The requirement that a valid password contain a combination of upper and lower case characters, at least one numeric character, and at least one special character
- The requirement that a valid password may not contain the user's username
- The maximum number of days to elapse before a password expires
- The minimum number of days to elapse before a previously used password may be re-used

Note: Appendix B of the Teradata Database Security Administration reference manual provides guidelines that must be followed "to operate the system at a level of security equivalent to the Common Criteria evaluated configuration." This guidance requires that the default password control policy be configured as follows:

- minimum number of characters required in a valid password string - PasswordMinChar = 8 characters
- maximum number of characters allowed in a valid password string - PasswordMaxChar = 30 characters
- digits required in password - PasswordDigits = 'r'
- alpha and special characters required in password - PasswordSpecChar = 'r'
- username not allowed in password - PasswordSpecChar = 'r'
- number of erroneous sequential logon attempts a user is allowed before the user is locked to further logon attempts – MaxLogonAttempts = 3 attempts
- user lock time duration after the user has exceeded the maximum number of logon attempts - LockedUserExpire = 5 minutes
- time span during which a password is valid - ExpirePassword = 90 days
- time span during which a password may not be reused - PasswordReuse = 270 days

To logon to the Teradata Database, a user provides a username and password. The database verifies that the username and password are valid by comparing them to the corresponding security attributes stored in the data dictionary. If either the username or password is not valid, then the logon will fail and no TSF-mediated actions will be performed on behalf of the user.

If the user exceeds the maximum number of failed logon attempts, then the database will prevent further logon attempts by the user until the applicable password lockout time has elapsed. The guidance provided to the security administrator recommends configuring the password lockout time control such that the user remains locked for a period of 5 minutes.

Upon successful identification and authentication of a user, the Teradata Database establishes a binding between the user identity and the established database session. When a session is established, the session's active role is set to the default role indicated by the user's security attributes if a default role has been granted by the authorized security administrator. During a session, a user may change his or her password in accordance with the password control policy. Also during a session, a user may set the active role to any other role, or `ALL` roles, that have been granted to the user by the authorized security administrator.

Administrator access to database control utilities and other utilities is controlled by the underlying operating system. As such, there is a dependency on the operational environment to provide identification and authentication mechanisms to control access to utilities under the control of the operating system.

The Identification and Authentication security function satisfies the following security functional requirements:

- FIA_AFL.1 Authentication failure handling – The TOE satisfies this requirement by allowing a security administrator to define the maximum number of failed login attempts allowed before the user account is locked.
- FIA_ATD.1 User attribute definition – The TOE satisfies this requirement by maintaining an association between users, passwords roles, and profiles.
- FIA_SOS.1 Verification of secrets – The TOE satisfies this requirement by allowing a security administrator to define rules required for construction of a valid password.
- FIA_UAU.1 Timing of authentication – The TOE satisfies this requirement by ensuring that, after establishment of a virtual circuit, a user is properly authenticated before allowing any other TSF-mediated actions on behalf of that user.
- FIA_UID.1 Timing of identification – The TOE satisfies this requirement by ensuring that, after establishment of a virtual circuit, a user is properly identified before allowing any other TSF-mediated actions on behalf of that user.
- FIA_USB.1 User-subject binding – The TOE satisfies this requirement by associating the user's security attributes with the user's session.

7.1.3 User Data Protection

The parser module is directly responsible for discretionary access control (DAC). It is responsible for both generating rows in the system access rights table that give a user (subject) the right to access an object and for checking of those access rights on subsequent execution of SQL statements.

All user (subject) access to database objects subject to the DAC policy is controlled using access rights. Types of database objects include `DATABASE`, `USER`, `TABLE`, `VIEW`, `TRIGGER`, `MACRO`, `PROCEDURE`, `FUNCTION`, `ROLE`, and `PROFILE`. [Note that the Teradata Database supports the concept of a `USER` object - distinct and separate from the concept of a user as a subject. A `DATABASE` object and a `USER` object are *almost* identical in the Teradata Database. The difference is that a `USER` object contains all of the attributes of a `DATABASE` object (space allocations, journals, etc.) plus a set of attributes specifically used during session establishment (collation sequence, time zone, default character set, etc.).] Access rights are maintained through the data dictionary for which access is similarly controlled.

Upon initial installation of the Teradata Database, it has only one user. This user is called user `DBC` and will own all other databases and users in the system. User `DBC` also has access rights on all objects within the database. The administrator guidance recommends that an administrative user be created under user `DBC` and granted access rights for creating and managing other databases and objects. An administrator will log on as that user rather than as user `DBC` to perform normal administrative tasks. Creating an administrative user under user `DBC` is standard practice and provides protection of sensitive data and system objects owned by user `DBC`. Similarly, the administrator guidance also recommends creating a separate security administrator under user `DBC` and granting that user access rights for creating and managing users, roles, profiles, configuration of security controls, and controlling the security audit facility.

The Teradata Database supports three types of access rights. Implicit rights (ownership rights) are implicitly granted to the immediate owner of a database or database object. Automatic rights include all rights on a database, user, or object and are granted automatically by the system to the creator of a database, user, or object, and to a newly created user or database. The immediate owner of an object is not necessarily the same as the creator of the object. Explicit rights are granted by any user having the `WITH GRANT OPTION` privilege for that right. The database ensures that the requestor has the appropriate access rights before access to a database object is allowed. Explicit rights can be granted to one or more specific database or users or, alternatively, granted to “`ALL`” which results in the right being granted to every existing database or user owned by that database or user as well as any database or user owned by that database or user that may be created in the future.

The Teradata Database allows for ownership of database and user objects to be transferred from the immediate owner to another owner. Upon the transfer of ownership, implicit rights (ownership rights) on the database or user being given are removed from the previous owner and given to the new owner. The transfer of ownership does not revoke any explicit rights on the given database or user. No explicit rights on the given database or user are granted to the new ownership hierarchy as a result of the transfer of ownership, nor does the database or user being given receive any explicit rights.

Roles define access rights on database objects for groups of users. An authorized security administrator can assign one or more roles to a user (including a default role). A user who is a member of a role can access all the objects for which the role has access rights. Users can switch from the default role to any other role for which they are a member.

The DAC policy for object access is based on user identities, access rights, and active roles. The following enforceable rules combine to control access to database objects (e.g., databases, users, views, macros, stored procedures, and functions) and the operations that can be performed on these objects:

- Every object created in the database is uniquely identified and the TOE correctly resolves all references to an object.

- The TOE enforces Discretionary Access Control (DAC) on objects based on the following user (subject) attributes: (a) identity of the user associated with the session, (b) access rights associated with the user, and (c) access rights associated with any roles active for the user's session.
- The TOE enforces Discretionary Access Control (DAC) on objects based on the following object attributes: (a) the identity of the owner of the object, (b) the object rights granted on the object, and (c) any security policies in force for the object.
- An access right is effective in a user session only if: (a) the access right was granted directly and has not been revoked, (b) the access right was granted indirectly (e.g., implicitly, automatically) and has not been revoked, or (c) the access right was granted to the user via membership in a role and has not been revoked from the role, and the role is active in the current session.

The TOE enforces the following rules to determine if access by a subject to a database object is allowed:

- If the user associated with the database session is the owner of the database object, then access to the database object is allowed.
- If the required access right on the database object (or the containing database) has been explicitly or implicitly granted to the user associated with the database session, then access to the database object is allowed.
- If a role is active within the session and the required access right on the database object (or the containing database) has been explicitly granted to the role associated with the database session or to a role nested within the role associated with the database session, then access to the database object is allowed. (A nested role is a role that has been granted to another role. Roles can only be nested one level deep.)
- If the required access right on the database object (or the containing database) has been explicitly granted to `PUBLIC`, then access to the database object is allowed.

Table 7-1 provides a mapping of typical access rights that may be implicitly, automatically, or explicitly granted to a user (subject) that govern access to the different types of database objects.

Table 7-1 Database Object and Access Rights Mapping

	CREATE	DROP	ALTER	SELECT	INSERT	UPDATE	DELETE	EXECUTE	INDEX	DUMP	RESTORE
DATABASE	X	X		X	X	X	X			X	X
USER	X	X		X	X	X	X			X	X
TABLE	X	X		X	X	X	X		X		

VIEW	X	X		X	X	X	X				
TRIGGER	X	X									
MACRO	X	X						X			
PROCEDURE	X	X	X					X			
FUNCTION	X	X	X					X			
ROLE	X	X									
PROFILE	X	X									

The TOE protects against inappropriate reuse of any resource associated with an allocated database object by ensuring that any previous information content associated with that resource is unavailable by ensuring that rows written to disk will overlay all of the storage allocated to the row and by insuring that only rows or the columns extracted from rows are returned as part of a result set. Also, the TOE allows no access to any object once the object has been deleted or dropped.

The Teradata Database operates as a set of cooperating processes which are managed by the underlying operating system. These processes operate such that no interference is allowed by processes associated with any non-TOE entities. Furthermore, the Teradata Database is designed such that its interfaces do not allow unauthorized users access to database resources.

Note that given the defined TOE boundaries, the TOE protection mechanisms could be bypassed through the underlying operational environment. As such, it is assumed that the operational environment provides an isolated domain for the execution of the TOE and ensures that the TOE security mechanisms cannot be bypassed in order to gain access to the TOE resources.

The User Data Protection security function satisfies the following security functional requirements:

- FDP_ACC.1 Subset access control – The TOE satisfies this requirement by associating access rights with all operations that can be performed on database objects and requiring that a user (subject) have the appropriate right in order to perform the corresponding operation.
- FDP_ACF.1 Security attribute based access control – The TOE satisfies this requirement by enforcing a discretionary access control policy based upon user identity and access rights associated with the user, active roles, and database objects.
- FDP_RIP.1 Subset residual information protection – The TOE satisfies this requirement by ensuring that no previous information content associated with a database object is available when the object is re-used.

7.1.4 Security Audit

The parser module is directly responsible for access logging. (The term “access logging” is used as opposed to “audit” since auditing is done based upon accesses to database objects.)

The following steps are required to enable and manage the access logging facility:

- A database initialization program (DIP) script must be run to create the special access log rule macro.
- The database must be reset to initialize the logging software.

By default, only user `DBC` has the rights to control the access logging facility. The rights to control the access logging facility are determined by the right to `EXECUTE` the access log rule macro. User `DBC` may grant this right to a security administrator.

The security administrator can perform the following actions to control the monitoring of access rights checks performed by Teradata Database:

- Begin logging auditable events, including specifying the rules that determine which accesses are logged
- End logging auditable events
- Query the rules that are used to determine which accesses are logged
- Query access log table records containing auditable events
- Purge aged records from the access log table

System event log records are used to indicate startup and shutdown of the auditing facility.

Rules can be specified to audit events based upon one, all, or any combination of the following items:

- Type of access
- Frequency of access
- Action requested
- Name of the requesting user
- Objects referenced
- Success or failure of the access

The Teradata Database will record the following information into each access log record that is generated, provided that a rule exists to indicate that the information should be recorded: Date and time on which the event was logged; username of the user for whom the log entry was made; session number assigned to the user’s session; result code indicating whether the access request was granted or denied; the type of access right for which the check that generated the log entry was performed; the name of the database object for which the log entry was made; the text of the statement that caused the access right check for which the log entry was made.

The time stamp used for recording the date and time on which an event is logged is obtained from the underlying operating system. As such, the security audit functions have a dependency upon the operational environment to provide a reliable time stamp.

All audit logs are maintained in protected tables within the data dictionary. Access to the audit log tables and defined system views is restricted to the authorized security administrator. The security administrator may search and sort access log records using SQL statements to query a defined system view. As with any SQL query, a result set can be sorted by any of the view's columns, which include date, time, user name, result, object name, etc.

The security administrator may purge aged records from the access log using a defined system view. The view contains logic to ensure that a minimum of 30 days of the most recent logged records are retained.

The Teradata Database automatically audits all successful and failed user logon attempts in the event log. The security administrator may search and sort logon/logoff records using SQL statements to query a defined system view.

Since the audit logs are maintained in protected tables within the data dictionary, the size of the logs is limited only by available permanent space for the user `DBC`. If permanent space for user `DBC` is exhausted, then the database will generate an error log entry and perform a reset.

The Security Audit security function satisfies the following security functional requirements:

- FAU_GEN.1 Audit data generation – The TOE satisfies this requirement by generating the necessary audit records associated with each auditable event and by including the date and time, event type, user identity, result code, and other relevant information in each record.
- FAU_GEN.2 User identity association – The TOE satisfies this requirement by including the associated user identity in each audit record.
- FAU_SAR.1 Audit review – The TOE satisfies this requirement by allowing the security administrator to access audit records using SQL commands.
- FAU_SAR.2 Restricted audit review - The TOE satisfies this requirement by restricting access to audit records to only the security administrator.
- FAU_SAR.3 Selectable audit review – The TOE satisfies this requirement by allowing the security administrator to search and sort audit records based upon information contained in the records.
- FAU_SEL.1 Selective audit – The TOE satisfies this requirement by allowing the security administrator to establish rules to determine whether events will be included or excluded from the audit log.
- FAU_STG.1 Protected audit trail storage – The TOE satisfies this requirement by protecting the audit records such that no alterations can be made to the audit records, only the security administrator may have access to the audit records, and only the security administrator may purge aged audit records.

7.1.5 Security Management

The Security Management functions enable the authorized security administrator to manage the secure operation of the Teradata Database. During the initial database configuration, the initial user in the system (`DBC`) creates a new security administrator user (e.g., `SECADMIN`) with appropriate access rights in order to manage security in a structured manner.

The `DBC` user has all security rights on the database. The Teradata Database security features allow for the `DBC` user to grant rights associated with security management solely to a security administrator. The designated security administrator typically performs the following duties:

- Establishes and modifies logon rules
- Grants, monitors, and if necessary, revokes access rights
- Defines the users, objects, and SQL functions, if any, to be audited
- Monitors audit logs to detect security incidents and initiate corrective action

Access to database objects is controlled through the use of user ids and associated roles, as explained in the access control security function. Only the authorized security administrator may add, modify, or delete TSF data associated with users and roles. However, other users may be authorized to grant or revoke access rights on database objects based upon ownership rights or other rights which have been explicitly granted to the user.

A user who creates a database or another user becomes the owner and is implicitly granted ownership rights on that space. As the owner of the new space, the user is also automatically granted access rights to anything created in that space. If the new space is a user, the owning user is considered the parent and the newly created user is considered its child. In turn, a child becomes the parent of any new users it creates. A parent may grant itself rights on any objects owned by any of its child users. The immediate owner of an object is the containing user or database. However, the parents in the hierarchy above the containing user or database are also indirect owners of the object. An owner can grant or revoke any right applied to an owned object.

A new user or database is automatically granted all rights on itself, with the exception of the `GRANT` (`WITH GRANT OPTION`) and `CREATE DATABASE/USER`, `CREATE PROCEDURE`, and `EXECUTE PROCEDURE` rights. Thus, a newly created user can create tables, views, and macros within its own user space. The automatic right to create objects can be explicitly revoked from a new user by an owner or by the creator of the user. A user can be explicitly granted the right to create databases and other users in its own user space. This right can only be granted by a user who has the `GRANT` right (`WITH GRANT OPTION`) and the right to create such users and databases. In the case of stored procedure-related rights, a newly created user gets only the `DROP PROCEDURE` access right. The rights to create or execute stored procedures are not automatic. These can be explicitly granted to any user by user `DBC` or by a user having the rights `WITH GRANT OPTION`. If a user has been granted either the `CREATE DATABASE` or the `CREATE USER` right, and subsequently creates a new database or user, Teradata Database automatically grants to that user a series of creator rights on the created space. Similarly, a series of creator rights are automatically granted to the user that creates any database object.

A user may revoke rights on an object from another user, role, or '`ALL USERS`' only if the user is an owner of the object to which the rights refer, or has the `GRANT` right (`WITH GRANT OPTION`), plus all of the rights that are to be revoked on the object. If the object is a view, stored procedure, or macro, the owner of the view or macro must also have the `GRANT` right (`WITH GRANT OPTION`), plus all other applicable rights, on the objects referenced by the view, stored procedure, or macro. Implicit ownership rights cannot be revoked. Revoked access rights take effect immediately.

A user must have the CREATE ROLE right to create a role. New users do not implicitly have the CREATE ROLE right. To grant a role, a user must have the `WITH ADMIN OPTION` privilege on the role. The following users can grant a role to a user or other role:

- User `DBC`.
- A user who has been granted the specified role `WITH ADMIN OPTION`. The creator of a role is automatically granted the specified role `WITH ADMIN OPTION`.
- A user who has an active role to which the specified role was granted `WITH ADMIN OPTION`. An active role can be a current role or a nested role of a current role.

A grantor does not need to have any rights, including `WITH ADMIN OPTION`, on the grantee to grant a right to it, whether the grantee is a role or a user.

Rules to configure access logging are managed using the `BEGIN LOGGING` and `END LOGGING` SQL statements. By default, only user `DBC` has the rights to control the access logging facility. The rights to control the access logging facility are determined by the right to `EXECUTE` the access log rule macro. User `DBC` may grant this right to the authorized security administrator.

The Teradata Database enforces maximum quotas and limits on various resources to ensure that those resources are protected from monopolization by any individual database user. Permanent, temporary, and spool space limits are managed by the authorized security administrator through the use of `CREATE/MODIFY USER/DATABASE` statements.

The Security Management security function satisfies the following security functional requirements:

- FMT_MOF.1 Management of security functions behavior – The TOE satisfies this requirement by restricting the ability to manage the audit function to the authorized security administrator.
- FMT_MSA.1 Management of security attributes – The TOE satisfies this requirement by restricting to only authorized users the ability to modify access rights associated with operations on database objects and to only the authorized security administrator for granting use of a role.

- FMT_MSA.3 Static attribute initialization – The TOE satisfies this requirement by ensuring that default access rights are granted to database objects and owners whenever an object is created.
- FMT_MTD.1 Management of TSF data – The TOE satisfies this requirement by ensuring that only the authorized security administrator may create or modify TSF data associated with users, roles, the audit function, and maximum quotas.
- FMT_REV.1 Revocation – The TOE satisfies this requirement by ensuring that only authorized users may revoke rights associated with operations on database objects.
- FMT_SMF.1 Specification of management functions – The TOE satisfies this requirement by providing an interface through which the authorized security administrator may manage users, authentication data, security roles, and the audit function, and set maximum quotas.
- FMT_SMR.1 Security roles – The TOE satisfies this requirement by allowing the authorized security administrator to create and maintain roles and to associate users with roles.

7.1.6 Resource Utilization

The Teradata Database enforces maximum quotas and limits on various resources to ensure that those resources are protected from monopolization by any individual database user.

Permanent space is used to store tables, indexes, stored procedures, functions, and permanent journals. Permanent space limits are enforced at the database or user (not table) level. The security administrator defines the maximum limit for a user with the `PERM` parameter of a `CREATE/MODIFY USER` statement and an authorized database administrator defines the maximum limit for a database with the `PERM` parameter of a `CREATE/MODIFY DATABASE` statement.

Temporary space is used to hold rows of materialized global temporary tables. It is allocated at the database or user level, but not the table level. The security administrator may define the maximum limit with the `TEMPORARY` parameter of a `CREATE/MODIFY USER` statement or through a user profile assigned to a user. If a temporary space limit is not explicitly specified for a user or database, then the temporary space limit is inherited from the specification for the immediate owner of the user or database.

Spool space is used to hold the response rows of every query run by a user during a session, to hold intermediate result sets produced during execution of a query, and to hold volatile tables produced during execution of a query. The Teradata Database allocates spool space dynamically only from space that is not being used for permanent or temporary data. The security administrator may define the maximum limit with the `SPOOL` parameter of a `CREATE/MODIFY USER/DATABASE` statement or through a user profile assigned to a user. If a spool limit is not explicitly specified for a user or database, then the spool limit is inherited from the specification for the immediate owner of the user or database.

The Resource Utilization function satisfies the following security functional requirements:

- FRU_RSA.1 Maximum Quotas – The TOE satisfies this requirement by enforcing maximum space limits to prevent excessive monopolization of resources by any individual database user.

7.2 TOE SUMMARY SPECIFICATION RATIONALE

Table 7-2 demonstrates that each SFR is satisfied by the TOE Security Functionality.

Table 7-2 TSF and SFR Mapping

	TOE Access	Identification and Authentication	User Data Protection	Security Audit	Security Management	Resource Utilization
FAU_GEN.1				X		
FAU_GEN.2				X		
FAU_SAR.1				X		
FAU_SAR.2				X		
FAU_SAR.3				X		
FAU_SEL.1				X		
FAU_STG.1				X		
FDP_ACC.1			X			
FDP_ACF.1			X			
FDP_RIP.1			X			
FIA_AFL.1		X				
FIA_ATD.1		X				
FIA_SOS.1		X				
FIA_UAU.1		X				
FIA_UID.1		X				
FIA_USB.1		X				
FMT_MOF.1					X	
FMT_MSA.1					X	
FMT_MSA.3					X	
FMT_MTD.1					X	
FMT_REV.1					X	
FMT_SMF.1					X	
FMT_SMR.1					X	

	TOE Access	Identification and Authentication	User Data Protection	Security Audit	Security Management	Resource Utilization
FRU_RSA.1						X
FTA_TSE.1	X					

APPENDIX A - ACRONYMS

AMP	Access Module Processor
AWS	Administration Workstation
CLI	Call Level Interface
CNS	Console Subsystem
CPU	Central Processing Unit
DAC	Discretionary Access Control
DBMS	Database Management System
DBW	Database Window
LAN	Local Area Network
MPP	Massive Parallel Processing
OS	Operating System
PDE	Parallel Database Extensions
PE	Parsing Engine
RDBMS	Relational Database Management System
SMP	Symmetric Multi Processing
SLES	SUSE Linux Enterprise Server
SQL	Structured Query Language
TDP	Teradata Director Program
vdisk	Virtual Disk
vproc	Virtual Processor