

CUDB Node Fault Management Configuration Guide

USER GUIDE

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1 Introduction

This document provides Fault Management (FM) information for the Ericsson Centralized User Database (CUDB).

1.1 Document Purpose and Scope

The purpose of this document is to provide a list of application alarms, and describe the alarm management and the application alarm model of the CUDB system. The infrastructure alarms of the system are not in the scope of this document, but are shortly summarized in Section 2.2 on page 21.

1.2 Revision Information

Rev. A

This document is based on 3/1553-CSH 109 067/9 with the following changes:

- Updated hardware information.
- Terminology updates throughout the document because of virtualized deployment support.
- Section 2.1.3.10 on page 17: Updated Figure 12 with licensing information and Table 11 with alarm raised by licensing problems.

Rev. B

Editorial changes only.

Rev. C

Other than editorial changes, this document has been revised as follows:

- Section 2.1.3.11 on page 17: Added new section related to SOAP Notifications.

Rev. D

Other than editorial changes, this document has been revised as follows:

- Section 2.1.3.5 on page 13: Added two new alarms to Table 6, `Control, Messaging Service Cluster Down` and `Control, Messaging Service Server Down`, and updated Figure 7 accordingly.



- Section 2.1.3.10 on page 17: Updated Figure 12 and removed the obsolete information from Table 11.

Rev. E

Other than editorial changes, this document has been revised as follows:

- Section 2.1.2 on page 4: Updated description regarding CUDB alarm management.

Rev. F

Other than editorial changes, this document has been revised as follows:

- Section 2.1.4 on page 18: Updated procedure.

1.3 Typographic Conventions

Typographic conventions can be found in the following document:

- *Typographic Conventions*

2 Alarms in the CUDB System

An alarm in the CUDB system is a message sent through the CUDB SNMP interface that informs the operator about a problem in the node which requires attention. The CUDB system can raise two types of alarms:

- Application alarms, raised by CUDB application components, including the software components encapsulated by CUDB.
- Infrastructure alarms, raised independently of the CUDB application.

Note: For CUDB systems deployed on a cloud infrastructure, then infrastructure alarms are not considered CUDB alarms.

For more information on the management and alarm model of the application alarms, see Section 2.1 on page 2. For a brief summary of the management of infrastructure alarms, see Section 2.2 on page 21.

2.1 Application Alarms

This section describes the management and alarm model of the CUDB application alarms.



CUDB application components (including the software component, that is the operating system and Core Middleware) send their alarms through the Ericsson SNMP Agent (ESA). The alarms sent to ESA are formatted according to the ERICSSON-SNF-ALARM-MIB and are sent to the Network Management System (NMS). For more information, refer to *ESA Fault Management*, Reference [93].

2.1.1 Alarm Format and Description

An alarm model is a logical description of the CUDB system described in a tree structure. The alarm model in Figure 1 illustrates the hierarchy of the CUDB application components which are able to raise alarms.

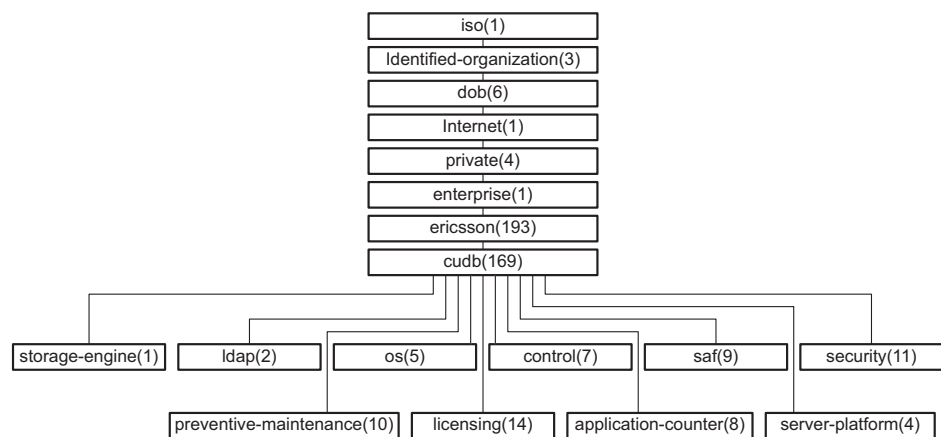


Figure 1 CUDB Alarms Model Overview

The alarm format used by the CUDB application components is defined by the ERICSSON-SNF-ALARM-MIB. For more information, refer to *ESA Fault Management*, Reference [93]. The standard location for this file, as well as for other `mib` files used by the CUDB FM interface, is defined by ESA in *ESA Setup and Configuration*, Reference [94].

Table 1 provides relevant information about the alarms. The *Severity*, *Alarm Event Type* and *Probable Cause* values follow the X.733 International Telecommunications Union (ITU) recommendation, refer to *Information Technology - Open Systems Interconnection - Systems Management Alarm Report*, Reference [95].

Table 1 Alarm-Related Information

Attribute Name	Attribute Value
Auto Cease	No if the alarm is not auto ceased; Yes otherwise.
Module	The CUDB application component that raises the alarm. See Figure 1 under cudb(169).
Error Code	Assigned number identifying the alarm within a certain module (application component).



Attribute Name	Attribute Value
Timestamp First	Date and time when the alarm was raised for the first time.
Repeated Counter	Number which indicates how many times the alarm was raised.
Timestamp Last	Date and time of the most recent alarm raise.
Resource ID	An identifier of the alarming resource. The Object Identifier (OID) derived from the alarm model is used as the base for this identifier.
Alarm Model Description	A short description of the event.
Alarm Active Description	A dynamic text with a detailed description of the event.
ITU Alarm Event Type	A text that describes the type of the selected event, for example Communications Alarm, Processing Error Alarm Or Operational Violation For more information, refer to <i>Information Technology - Open Systems Interconnection - Systems Management Alarm Reporting Function ITU-T X.733</i> , Reference [95].
ITU Alarm Probable Cause	A text that describes the probable cause of the event. For more information, refer to <i>Information Technology - Open Systems Interconnection - Systems Management Alarm Reporting Function ITU-T X.733</i> , Reference [95].
ITU Alarm Perceived Severity	The status of the event. One of the following: (1) - Cleared (2) - Indeterminate (3) - Critical (4) - Major (5) - Minor (6) - Warning For more information refer to <i>Information Technology - Open Systems Interconnection - Systems Management Alarm Reporting Function ITU-T X.733</i> , Reference [95].
Originating Source IP	Node IP where the alarm was raised.
Sequence Number	Number which indicates the order in which alarms are raised.

2.1.2 Alarm Management

The CUDB application does not provide specific management procedures for the mentioned alarms apart from the manual alarm clearing procedure provided by ESA, as described in Section 2.1.2.1 on page 4.

CUDB alarm management may be needed in the NMS in certain cases. For example, in case the CUDB System Controllers (SCs) restart simultaneously or a Linux® Distribution Extension (LDE) cluster reboots in the CUDB node, the CUDB alarm table on the NMS might not be in sync with the alarm table on the CUDB node. Depending on the NMS used, alarm synchronization may need to be triggered manually on the NMS.



2.1.2.1 Clearing Alarms

To clear an alarm, use the `fmsendmessage` command with the `clear` parameter:

```
# fmsendmessage -c <module> <errorcode> <resourceid> [<Alarm
Active Description>] <originatingsourceip>
```

where:

- `<module>` = Application ID of the alarm.
- `<errorcode>` = Error Code of the alarm.
- `<resourceid>` = Active Resource ID of the alarm, prefixed with a dot (".").
- `<Alarm Active Description>` = Optional parameter that sets the content of the Alarm Active Description. In case it is used, the default Alarm Active Description is replaced with the value of this parameter. For example, it can be used to indicate that the alarm was cleared manually by entering "Manually cleared by User".
- `<originatingsourceip>` = Originating Source IP of the alarm.

To clear the following non-autocease alarm:

```
-----
Module           : STORAGE-ENGINE
Error Code       : 8
Resource ID      : .1.3.6.1.4.1.193.169.1.2.8.100
Timestamp First  : Thu Sep 24 13:41:48 CEST 2015
Repeated Counter : 1
Timestamp Last   : Thu Sep 24 13:41:48 CEST 2015
Alarm Model Description : Memory usage at Warning level, Storage Engine.
Alarm Active Description : Storage Engine (DS-group #100): memory usage at Warning level.
ITU Alarm Event Type : 4
ITU Alarm Probable Cause : 151
ITU Alarm Perceived Severity : warning
Originating source IP : 10.143.56.132
Sequence Number  : 554
-----
```

this command is used:

```
# fmsendmessage -c STORAGE-ENGINE 8 .1.3.6.1.4.1.193.169.1.2.8.100 "Manually cleared by User" 10.143.56.132
```

Example 1 Clearing an Alarm



Warning!

Even though the help message of `fmsendmessage` suggests that the `<sourceIP>` parameter is optional, this is not the case in CUDB. If the parameter is not specified, the default value (IP address of the blade or Virtual Machine (VM) on which the command is executed) is used and the existing alarm is not cleared.

For instance, if the `fmsendmessage -c STORAGE-ENGINE 8 .1.3.6.1.4.1.193.169.1.2.8.100` command is executed (where the `<sourceIP>` parameter is missing), the alarm shown in Example 1 is not cleared.

2.1.3 Alarm List

Alarms are grouped by different application components, as shown in Figure 1. They are described in detail in the following subsection. The alarms in the tables are in alphabetical order.

2.1.3.1 Storage Engine

Storage Engine alarms are related to the Database Cluster. The alarm model for PLDB alarms is shown in Figure 2.

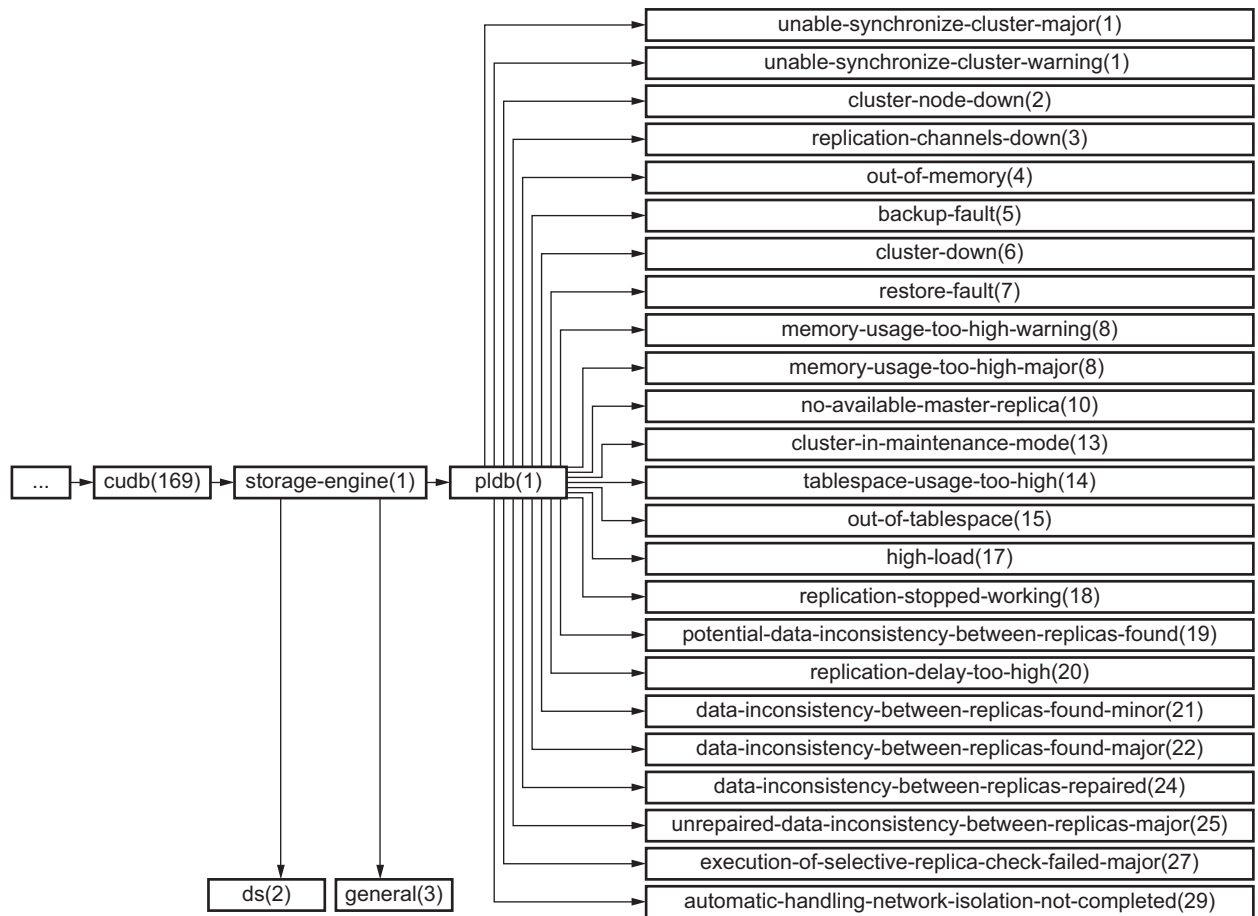


Figure 2 Alarm Model for PLDB Storage Engine Alarms

The alarm model for DS and general alarms is shown in Figure 3.

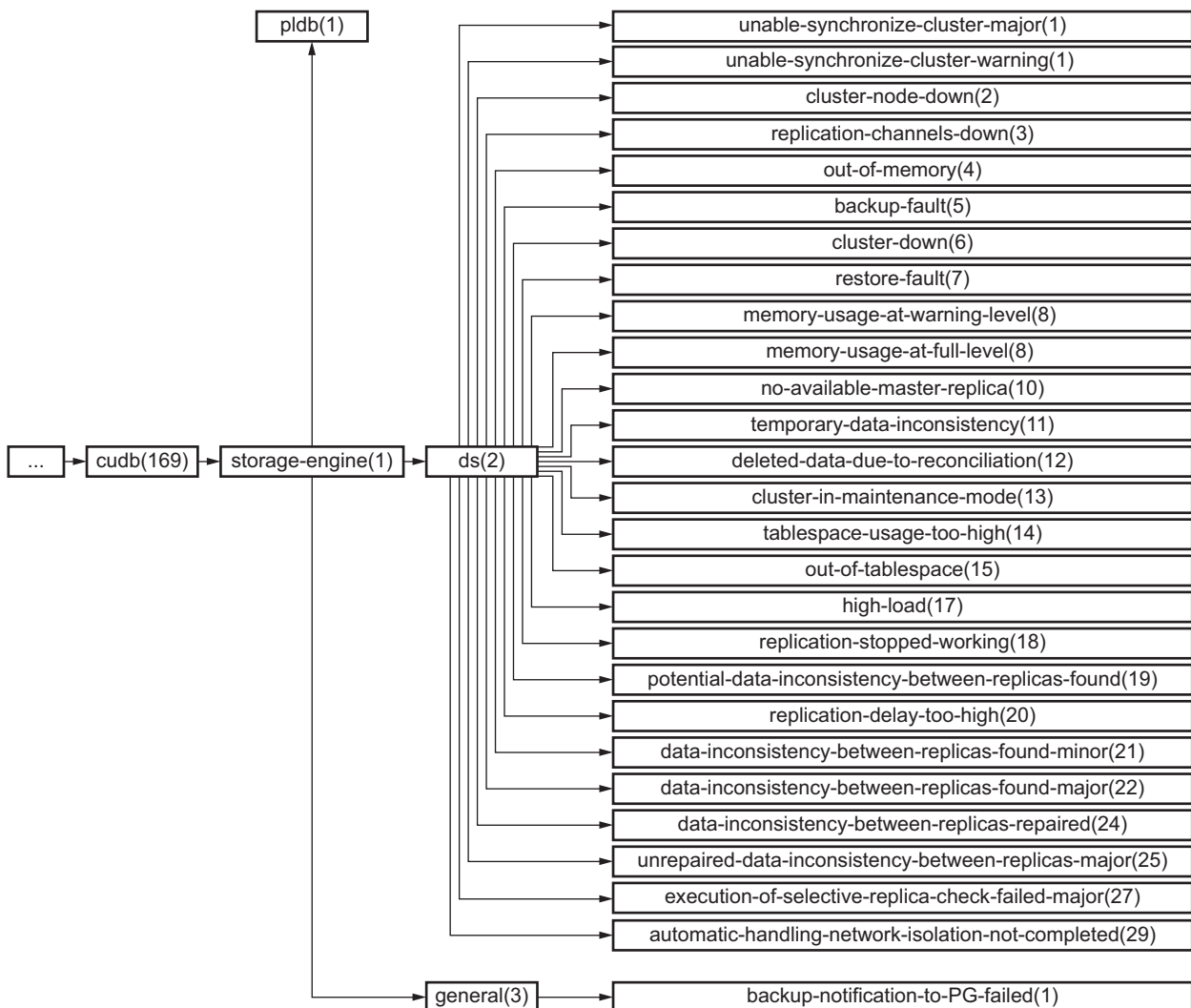


Figure 3 Alarm Model for DS and General Storage Engine Alarms

Table 2 shows the list of alarms related to Storage Engine.

Table 2 Alarms Raised by Storage Engine Problems

Alarm	Operating Instruction
Storage Engine, Automatic Handling of Network Isolation not Completed for DS	Refer to <i>Storage Engine, Automatic Handling of Network Isolation not Completed for DS</i> , Reference [1].
Storage Engine, Automatic Handling of Network Isolation not Completed for PLDB	Refer to <i>Storage Engine, Automatic Handling of Network Isolation not Completed for PLDB</i> , Reference [2].
Storage Engine, Backup Fault In DS	Refer to <i>Storage Engine, Backup Fault In DS</i> , Reference [3].



Table 2 Alarms Raised by Storage Engine Problems

Alarm	Operating Instruction
Storage Engine, Backup Fault In PLDB	Refer to <i>Storage Engine, Backup Fault In PLDB</i> , Reference [4].
Storage Engine, Backup Notification Failure To Provisioning Gateway	Refer to <i>Storage Engine, Backup Notification Failure To Provisioning Gateway</i> , Reference [5].
Storage Engine, Data Inconsistency between Replicas Found in DS, Major	Refer to <i>Storage Engine, Data Inconsistency between Replicas Found in DS, Major</i> , Reference [6].
Storage Engine, Data Inconsistency between Replicas Found in DS, Minor	Refer to <i>Storage Engine, Data Inconsistency between Replicas Found in DS, Minor</i> , Reference [7].
Storage Engine, Data Inconsistency between Replicas Found in PLDB, Major	Refer to <i>Storage Engine, Data Inconsistency between Replicas Found in PLDB, Major</i> , Reference [8].
Storage Engine, Data Inconsistency between Replicas Found in PLDB, Minor	Refer to <i>Storage Engine, Data Inconsistency between Replicas Found in PLDB, Minor</i> , Reference [9].
Storage Engine, Data Inconsistency between Replicas Repaired, DS	Refer to <i>Storage Engine, Data Inconsistency between Replicas Repaired, DS</i> , Reference [10].
Storage Engine, Data Inconsistency between Replicas Repaired, PLDB	Refer to <i>Storage Engine, Data Inconsistency between Replicas Repaired, PLDB</i> , Reference [11].
Storage Engine, Deleted Data Due to Reconciliation	Refer to <i>Storage Engine, Deleted Data Due to Reconciliation</i> , Reference [12].
Storage Engine, DS Cluster Down	Refer to <i>Storage Engine, DS Cluster Down</i> , Reference [13].
Storage Engine, DS Cluster in Maintenance Mode	Refer to <i>Storage Engine, DS Cluster in Maintenance Mode</i> , Reference [14].
Storage Engine, DS Cluster Node Down	Refer to <i>Storage Engine, DS Cluster Node Down</i> , Reference [15].
Storage Engine, Execution of Selective Replica Check Failed, DS, Major	Refer to <i>Storage Engine, Execution of Selective Replica Check Failed, DS, Major</i> , Reference [16].
Storage Engine, Execution of Selective Replica Check Failed, PLDB, Major	Refer to <i>Storage Engine, Execution of Selective Replica Check Failed, PLDB, Major</i> , Reference [17].
Storage Engine, High Load In DS	Refer to <i>Storage Engine, High Load In DS</i> , Reference [18].



Table 2 Alarms Raised by Storage Engine Problems

Alarm	Operating Instruction
Storage Engine, High Load In PLDB	Refer to <i>Storage Engine, High Load In PLDB</i> , Reference [19].
Storage Engine, Memory Usage Too High In DS, Full Threshold Reached	Refer to <i>Storage Engine, Memory Usage Too High In DS, Full Threshold Reached</i> , Reference [20].
Storage Engine, Memory Usage Too High In DS, Warning Threshold Reached	Refer to <i>Storage Engine, Memory Usage Too High In DS, Warning Threshold Reached</i> , Reference [21].
Storage Engine, Memory Usage Too High In PLDB, Major	Refer to <i>Storage Engine, Memory Usage Too High In PLDB, Major</i> , Reference [22].
Storage Engine, Memory Usage Too High In PLDB, Warning	Refer to <i>Storage Engine, Memory Usage Too High In PLDB, Warning</i> , Reference [23].
Storage Engine, No Available Master Replica for DS	Refer to <i>Storage Engine, No Available Master Replica for DS</i> , Reference [24].
Storage Engine, No Available Master Replica for PLDB	Refer to <i>Storage Engine, No Available Master Replica for PLDB</i> , Reference [25].
Storage Engine, Out Of Memory In DS	Refer to <i>Storage Engine, Out Of Memory In DS</i> , Reference [26].
Storage Engine, Out Of Memory In PLDB	Refer to <i>Storage Engine, Out Of Memory In PLDB</i> , Reference [27].
Storage Engine, Out Of Tablespace In DS	Refer to <i>Storage Engine, Out Of Tablespace In DS</i> , Reference [28].
Storage Engine, Out Of Tablespace In PLDB	Refer to <i>Storage Engine, Out Of Tablespace In PLDB</i> , Reference [29].
Storage Engine, PLDB Cluster Down	Refer to <i>Storage Engine, PLDB Cluster Down</i> , Reference [30].
Storage Engine, PLDB Cluster In Maintenance Mode	Refer to <i>Storage Engine, PLDB Cluster In Maintenance Mode</i> , Reference [31].
Storage Engine, PLDB Cluster Node Down	Refer to <i>Storage Engine, PLDB Cluster Node Down</i> , Reference [32].
Storage Engine, Potential Data Inconsistency between Replicas Found in DS	Refer to <i>Storage Engine, Potential Data Inconsistency between Replicas Found in DS</i> , Reference [33].
Storage Engine, Potential Data Inconsistency between Replicas Found in PLDB	Refer to <i>Storage Engine, Potential Data Inconsistency between Replicas Found in PLDB</i> , Reference [34].
Storage Engine, Replication Channels Down in DS	Refer to <i>Storage Engine, Replication Channels Down in DS</i> , Reference [35].



Table 2 Alarms Raised by Storage Engine Problems

Alarm	Operating Instruction
Storage Engine, Replication Channels Down in PLDB	Refer to <i>Storage Engine, Replication Channels Down in PLDB</i> , Reference [36].
Storage Engine, Replication Delay Too High In DS	Refer to <i>Storage Engine, Replication Delay Too High In DS</i> , Reference [37].
Storage Engine, Replication Delay Too High In PLDB	Refer to <i>Storage Engine, Replication Delay Too High In PLDB</i> , Reference [38].
Storage Engine, Replication Stopped Working in DS	Refer to <i>Storage Engine, Replication Stopped Working in DS</i> , Reference [39].
Storage Engine, Replication Stopped Working in PLDB	Refer to <i>Storage Engine, Replication Stopped Working in PLDB</i> , Reference [40].
Storage Engine, Restore Fault in DS	Refer to <i>Storage Engine, Restore Fault in DS</i> , Reference [41].
Storage Engine, Restore Fault in PLDB	Refer to <i>Storage Engine, Restore Fault in PLDB</i> , Reference [42].
Storage Engine, Tablespace Usage Too High In DS, Warning	Refer to <i>Storage Engine, Tablespace Usage Too High In DS, Warning</i> , Reference [43].
Storage Engine, Tablespace Usage Too High In PLDB, Warning	Refer to <i>Storage Engine, Tablespace Usage Too High In PLDB, Warning</i> , Reference [44].
Storage Engine, Temporary Data Inconsistency	Refer to <i>Storage Engine, Temporary Data Inconsistency</i> , Reference [45].
Storage Engine, Unable to Synchronize Cluster in DS, Major	Refer to <i>Storage Engine, Unable to Synchronize Cluster in DS, Major</i> , Reference [46].
Storage Engine, Unable to Synchronize Cluster in DS, Warning	Refer to <i>Storage Engine, Unable to Synchronize Cluster in DS, Warning</i> , Reference [47].
Storage Engine, Unable to Synchronize Cluster in PLDB, Major	Refer to <i>Storage Engine, Unable to Synchronize Cluster in PLDB, Major</i> , Reference [48].
Storage Engine, Unable to Synchronize Cluster in PLDB, Warning	Refer to <i>Storage Engine, Unable to Synchronize Cluster in PLDB, Warning</i> , Reference [49].
Storage Engine, Unrepaired Data Inconsistency between Replicas, PLDB	Refer to <i>Storage Engine, Unrepaired Data Inconsistency between Replicas, PLDB</i> , Reference [50].
Storage Engine, Unrepaired Data Inconsistency between Replicas, DS	Refer to <i>Storage Engine, Unrepaired Data Inconsistency between Replicas, DS</i> , Reference [51].



2.1.3.2 Lightweight Directory Access Protocol Front End

The alarm model for Lightweight Directory Access Protocol (LDAP) Front End (FE)-related alarms is shown in Figure 4.

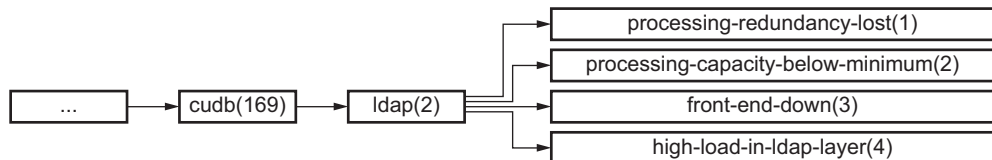


Figure 4 Alarm Model for LDAP Alarms

Table 3 shows the list of alarms related to LDAP FE.

Table 3 Alarms Raised by LDAP FE Problems

Alarm	Operating Instruction
LDAP Front End, High Load in LDAP Processing Layer	Refer to <i>LDAP Front End, High Load in LDAP Processing Layer</i> , Reference [53]
LDAP Front End, Processing Capacity Below Minimum	Refer to <i>LDAP Front End, Processing Capacity Below Minimum</i> , Reference [54]
LDAP Front End, Processing Redundancy Lost	Refer to <i>LDAP Front End, Processing Redundancy Lost</i> , Reference [55]
LDAP Front End, Server Down	Refer to <i>LDAP Front End, Server Down</i> , Reference [56]

2.1.3.3 Server Platform

The alarm model for Server Platform-related alarms is shown in Figure 5.

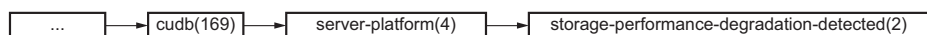


Figure 5 Alarm Model for Server Platform Alarms

Table 4 shows the list of alarms related to Server Platform.

Table 4 Alarms Raised by Server Platform Problems

Alarm	Operating Instruction
Server Platform, Storage Performance Degradation Detected	Refer to <i>Server Platform, Storage Performance Degradation Detected</i> , Reference [52]



2.1.3.4 Operating System

The alarm model for Operating System-related alarms is shown in Figure 6.

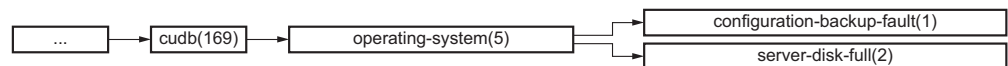


Figure 6 Alarm Model for Operating System Alarms

Table 5 shows the list of alarms related to the Operating System.

Table 5 Alarms Raised by Operating System Problems

Alarm	Operating Instruction
Operating System, Disk Usage Too High	Refer to <i>Operating System, Disk Usage Too High</i> , Reference [57]
Operating System, Server Configuration Backup Fault	Refer to <i>Operating System, Server Configuration Backup Fault</i> , Reference [58]

2.1.3.5 Control

The alarm model for node visibility and global system status related alarms is shown in Figure 7.

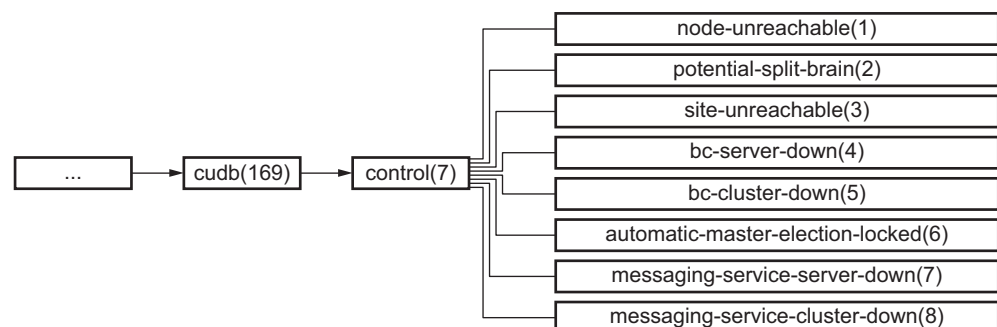


Figure 7 Alarm Model for Control Alarms

Table 6 shows the list of alarms related to Control.

Table 6 Alarm Raised by Control Problems

Alarm	Operating Instruction
Control, Automatic Master Election Locked Down	Refer to <i>Control, Automatic Master Election Locked Down</i> , Reference [59]

Table 6 Alarm Raised by Control Problems

Alarm	Operating Instruction
Control, Blackboard Coordination Cluster Down	Refer to <i>Control, Blackboard Coordination Cluster Down</i> , Reference [60]
Control, Blackboard Coordination Server Down	Refer to <i>Control, Blackboard Coordination Server Down</i> , Reference [61]
Control, Messaging Service Cluster Down	Refer to <i>Control, Messaging Service Cluster Down</i> , Reference [62]
Control, Messaging Service Server Down	Refer to <i>Control, Messaging Service Server Down</i> , Reference [63]
Control, Potential Split Brain Detected	Refer to <i>Control, Potential Split Brain Detected</i> , Reference [64]
Control, Remote Node Unreachable	Refer to <i>Control, Remote Node Unreachable</i> , Reference [65]
Control, Remote Site Unreachable	Refer to <i>Control, Remote Site Unreachable</i> , Reference [66]

2.1.3.6 Application Counters

The alarm model for Application Counters-related alarms is shown in Figure 8.



Figure 8 Alarm Model for Application Counters Alarms

Table 7 shows the list of alarms related to Application Counters.

Table 7 Alarm Raised by Application Counters Problems

Alarm	Operating Instruction
Application Counters, Fault In Subscriber Statistic Application	Refer to <i>Application Counters, Fault In Subscriber Statistic Application</i> , Reference [67]

2.1.3.7 Service Availability Forum

The alarm model for Service Availability Forum (SAF)-related alarms is shown in Figure 9.

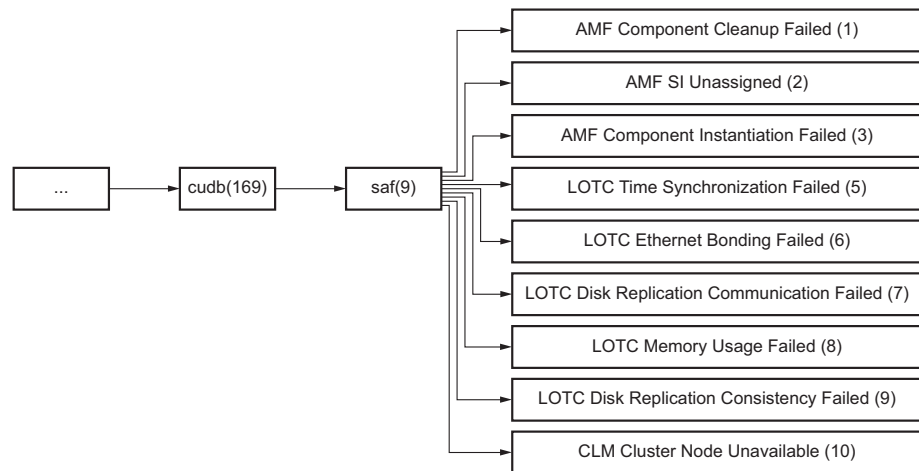


Figure 9 Alarm Model for SAF Alarms

Table 8 shows the list of alarms related to SAF.

Table 8 Alarms Raised by SAF Problems

Alarm	Operating Instruction
SAF, AMF Component Cleanup Failed	Refer to <i>SAF, AMF Component Cleanup Failed</i> , Reference [68]
SAF, AMF Component Instantiation Failed	Refer to <i>SAF, AMF Component Instantiation Failed</i> , Reference [69]
SAF, AMF SI Unassigned	Refer to <i>SAF, AMF SI Unassigned</i> , Reference [70]
SAF, CLM Cluster Node Unavailable	Refer to <i>SAF, CLM Cluster Node Unavailable</i> , Reference [71]
SAF, LOTC Disk Replication Communication Failed	Refer to <i>SAF, LOTC Disk Replication Communication Failed</i> , Reference [72]
SAF, LOTC Disk Replication Consistency Failed	Refer to <i>SAF, LOTC Disk Replication Consistency Failed</i> , Reference [73]
SAF, LOTC Ethernet Bonding Failed	Refer to <i>SAF, LOTC Ethernet Bonding Failed</i> , Reference [74]
SAF, LOTC Memory Usage Failed	Refer to <i>SAF, LOTC Memory Usage Failed</i> , Reference [75]
SAF, LOTC Time Synchronization Failed	Refer to <i>SAF, LOTC Time Synchronization Failed</i> , Reference [76]

2.1.3.8 Security

The alarm model for Security-related alarms is shown in Figure 10.

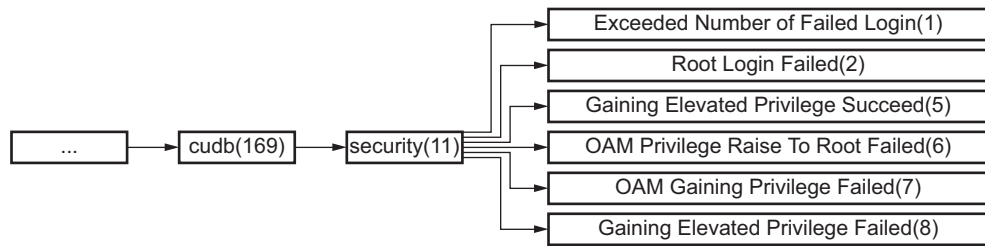


Figure 10 Alarm Model for Security Alarms

Table 9 shows the list of alarms related to Security.

Table 9 Alarms Raised by Security Problems

Alarm	Operating Instruction
Security, OAM User Exceeded Number Of Failed Logins	Refer to <i>Security, OAM User Exceeded Number Of Failed Logins</i> , Reference [77]
Security, OAM User Gaining Privilege Failed	Refer to <i>Security, OAM User Gaining Privilege Failed</i> , Reference [78]
Security, OAM User Privilege Raise To Root Failed	Refer to <i>Security, OAM User Privilege Raise To Root Failed</i> , Reference [79]
Security, Root Login Failed	Refer to <i>Security, Root Login Failed</i> , Reference [80]

2.1.3.9 Preventive Maintenance

The alarm model for Preventive Maintenance underlying related alarms is shown in Figure 11.

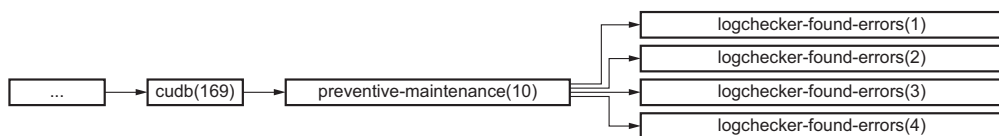


Figure 11 Alarm Model for Preventive Maintenance

Table 10 shows the list of alarms related to Preventive Maintenance.

Table 10 Alarm Raised by Preventive Maintenance Problems

Alarm	Operating Instruction
Preventive Maintenance, Logchecker Found Error(s)	Refer to <i>Preventive Maintenance, Logchecker Found Error(s)</i> , Reference [81].



2.1.3.10 Licensing

The alarm model for Licensing - related alarms is shown in Figure 12.

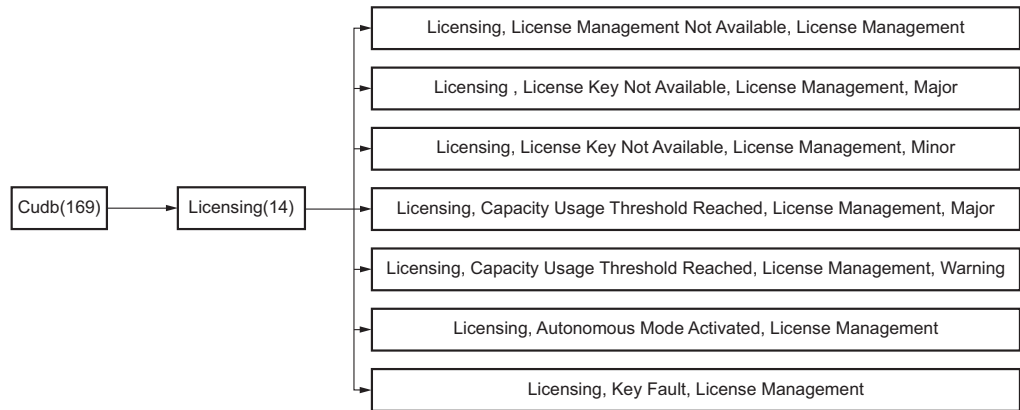


Figure 12 Alarm Model for Licensing Alarms

Table 11 shows the list of alarms related to Licensing.

Table 11 Alarms Raised by Licensing Problems

Alarm	Operating Instruction
Licensing, Autonomous Mode Activated	Refer to <i>Licensing, Autonomous Mode Activated</i> , Reference [82].
Licensing, Capacity Usage Threshold Reached, Major	Refer to <i>Licensing, Capacity Usage Threshold Reached, Major</i> , Reference [83].
Licensing, Capacity Usage Threshold Reached, Warning	Refer to <i>Licensing, Capacity Usage Threshold Reached, Warning</i> , Reference [84].
Licensing, Key File Fault	Refer to <i>Licensing, Key File Fault</i> , Reference [85].
Licensing, License Key Not Available, Major	Refer to <i>Licensing, License Key Not Available, Major</i> , Reference [86].
Licensing, License Key Not Available, Minor	Refer to <i>Licensing, License Key Not Available, Minor</i> , Reference [87].
Licensing, License Manager Not Available	Refer to <i>Licensing, License Manager Not Available</i> , Reference [88].

2.1.3.11 SOAP Notifications

The alarm model for SOAP Notifications-related alarms is shown in Figure 13.

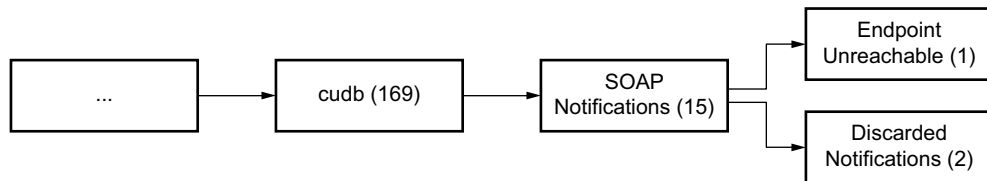


Figure 13 Alarm Model for SOAP Notifications Alarms

Table 12 Alarms Raised by SOAP Notifications Problems

Alarm	Operating Instruction
SOAP Notifications, Discarded Notifications	Refer to <i>SOAP Notifications, Discarded Notifications</i> , Reference [89].
SOAP Notifications, Endpoint Unreachable	Refer to <i>SOAP Notifications, Endpoint Unreachable</i> , Reference [90].

2.1.4 Alarm Relationships

The following alarm relationships are present in the system:

- Storage Engine alarms:
 - If memory usage gets to warning level, the *Storage Engine, Memory Usage Too High In PLDB, Warning*, Reference [23] alarm is raised. If memory usage then gets to major level, the *Storage Engine, Memory Usage Too High In PLDB, Major*, Reference [22] is raised, and the previous alarm is cleared. If memory usage continues growing, the *Storage Engine, Out Of Memory In PLDB*, Reference [27] alarm is raised, and the previous one is maintained.

The same principle applies for similar alarms related to DS.

- If the BLOB storage space usage reaches the warning level, the *Storage Engine, Tablespace Usage Too High In PLDB, Warning*, Reference [44] is raised. If the BLOB storage space usage continues growing until there is no more space left, the alarm *Storage Engine, Out Of Tablespace In PLDB*, Reference [29] is raised and the previous one is cleared.

The same principle applies for similar alarms related to DS.

- If the Consistency Check (refer to *CUDB Consistency Check*, Reference [91] for more information) finds any inconsistencies between two replicas, the *Storage Engine, Data Inconsistency between Replicas Found in PLDB, Minor*, Reference [9] or *Storage Engine, Data Inconsistency between Replicas Found in PLDB, Major*, Reference [8] alarm is raised, depending on the type and amount of inconsistencies. If any of these alarms have been raised earlier before running the Consistency Check, the earlier alarms are cleared, and a new one is



raised, if necessary, with the proper severity. These two alarms cannot be raised simultaneously.

The same principle applies to similar alarms related to the DS.

- If the Automatic Handling of Network Isolation function is enabled, when a former PLDB master replica rejoins the system as a slave replica (that is, recovery from a system split situation or unexpected mastership change) and it is not able to get in sync with the current master replica, then:
 - The *Storage Engine, Unable to Synchronize Cluster in PLDB, Warning*, Reference [49] alarm is raised and the Automatic Handling of Network Isolation task is started.
 - After the execution of the first part of the Automatic Handling of Network Isolation task, the Selective Replica Check subtask:
 - 1 The *Storage Engine, Execution of Selective Replica Check Failed, PLDB, Major*, Reference [17] alarm is raised if some entries were impossible to retrieve.
 - 2 The *Storage Engine, Automatic Handling of Network Isolation not Completed for PLDB*, Reference [2] alarm is raised if Selective Replica Check subtask cannot be completed.
 - 3 The *Storage Engine, Unable to Synchronize Cluster in PLDB, Warning*, Reference [49] alarm is cleared. The alarm that follows depends on whether the Self-Ordered Backup and Restore function is enabled, irrespective of whether the Selective Replica Check subtask could be completed and irrespective of its outcome.

If Self-Ordered Backup and Restore function is enabled, it does not start if all PLDB replicas in the site are slaves that are unable to synchronize with the current master. In case the Self-Ordered Backup and Restore function is disabled, or the starting criteria are not met, the *Storage Engine, Unable to Synchronize Cluster in PLDB, Major*, Reference [48] alarm is raised, otherwise a new *Storage Engine, Unable to Synchronize Cluster in PLDB, Warning*, Reference [49] alarm is raised, which indicates the start of the Self-Ordered Backup and Restore process.
 - After the execution of the second part of the Automatic Handling of Network Isolation, the Data Repair subtask:
 - 1 The *Storage Engine, Data Inconsistency between Replicas Repaired, PLDB*, Reference [11] alarm is raised if any LDAP entry has been repaired.



- 2 The *Storage Engine, Unrepaired Data Inconsistency between Replicas, PLDB*, Reference [50] alarm is raised if some LDAP entries were impossible to repair.
- 3 The *Storage Engine, Automatic Handling of Network Isolation not Completed for PLDB*, Reference [2] alarm is raised if the Data Repair subtask could not be completed.

Note: The second part of the Automatic Handling of Network Isolation task, the Data Repair subtask, is started only if the execution of Selective Replica Check subtask was completed.

All previously raised alarms, except for the *Storage Engine, Unable to Synchronize Cluster in PLDB, Warning*, Reference [49] alarm, are maintained.

The same principles apply to DSs and alarms related to DS.

- If the Self-Ordered Backup and Restore function is enabled, it does not start if all PLDB replicas in the site are slaves that are unable to synchronize with the current master. When a slave PLDB replica is unable to get in sync with the current master replica, the following applies:
 - The *Storage Engine, Unable to Synchronize Cluster in PLDB, Warning*, Reference [49] alarm is raised and the Self-Ordered Backup and Restore task is started.

In case the Automatic Handling of Network Isolation function is enabled, then raising this alarm is postponed until the alarm *Storage Engine, Unable to Synchronize Cluster in PLDB, Warning*, Reference [49] related to the execution of Selective Check subtask of Automatic Handling of Network Isolation is cleared.

- After the execution of the Self-Ordered Backup and Restore task:
 - 1 The *Storage Engine, Unable to Synchronize Cluster in PLDB, Warning*, Reference [49] alarm, related to Self-Ordered Backup and Restore task is cleared irrespective of whether the Self-Ordered Backup and Restore task could be completed and irrespective of its outcome.
 - 2 The *Storage Engine, Unable to Synchronize Cluster in PLDB, Major*, Reference [48] alarm is raised if the Self-Ordered Backup and Restore task failed to restore the replication.

Note: Previously raised alarms, except for the *Storage Engine, Unable to Synchronize Cluster in PLDB, Warning*, Reference [49] alarm, are maintained.



Alarms related to the execution of Data Repair subtask of the Automatic Handling of Network Isolation function may be raised in parallel with alarms related to the Self-Ordered Backup and Restore function.

The same principles apply to DSs and alarms related to DS.

- LDAP FE alarms:
 - The *LDAP Front End, Server Down*, Reference [56] alarm is linked to each LDAP FE component in the CUDB node. On the other hand, there is a **redundancy level** indication, corresponding to the maximum number of redundant LDAP FE elements. It is the number of LDAP FEs that can be down without the CUDB node losing its required level of performance.
 - When the number of LDAP FEs down is equal to **redundancy level**, the alarm *LDAP Front End, Processing Redundancy Lost*, Reference [55] is raised, while *LDAP Front End, Server Down*, Reference [56] alarms related to those LDAP FEs are maintained.
 - If one or more LDAP FEs go down, the alarm *LDAP Front End, Processing Capacity Below Minimum*, Reference [54] is raised, but all previous ones are maintained.

2.2 Infrastructure Alarms

Consider the following regarding infrastructure alarms:

- For CUDB systems deployed on native BSP 8100, the CUDB infrastructure alarms are raised by the underlying BSP 8100 management software. Unlike application ones, these alarms are not sent through ESA agents which are part of the CUDB application. More information on the infrastructure alarms and SNMP configuration can be found in the “BSP Fault Management” and “BSP System Notifications” documents in the BSP 8100 CPI.
- For CUDB systems deployed on a cloud infrastructure, refer to the alarm-related documentation of the infrastructure for more information on the infrastructure alarms and SNMP configuration.

3 Configuration

Some of the alarms are raised when the value of a parameter in CUDB goes above a configured threshold. See the specific alarm OPIs for information on



the applicable parameters and thresholds, and how to configure them. It is also possible to configure the NMS IP address where alarm traps are sent. The version used for SNMP is version 3.

For more details about how to configure SNMP for CUDB application components, refer to *ESA Fault Management*, Reference [94]. For more information on configuring SNMP for infrastructure components, see Section 2.2 on page 21.

Note: In CUDB ESA configuration, the Master Agent Main Port is 60.



Glossary

For the terms, definitions, acronyms and abbreviations used in this document, refer to *CUDB Glossary of Terms and Acronyms*, Reference [92].





Reference List

CUDB Documents

- [1] *Storage Engine, Automatic Handling of Network Isolation not Completed for DS*
- [2] *Storage Engine, Automatic Handling of Network Isolation not Completed for PLDB*
- [3] *Storage Engine, Backup Fault In DS*
- [4] *Storage Engine, Backup Fault In PLDB*
- [5] *Storage Engine, Backup Notification Failure To Provisioning Gateway*
- [6] *Storage Engine, Data Inconsistency between Replicas Found in DS, Major*
- [7] *Storage Engine, Data Inconsistency between Replicas Found in DS, Minor*
- [8] *Storage Engine, Data Inconsistency between Replicas Found in PLDB, Major*
- [9] *Storage Engine, Data Inconsistency between Replicas Found in PLDB, Minor*
- [10] *Storage Engine, Data Inconsistency between Replicas Repaired, DS*
- [11] *Storage Engine, Data Inconsistency between Replicas Repaired, PLDB*
- [12] *Storage Engine, Deleted Data Due to Reconciliation*
- [13] *Storage Engine, DS Cluster Down*
- [14] *Storage Engine, DS Cluster in Maintenance Mode*
- [15] *Storage Engine, DS Cluster Node Down*
- [16] *Storage Engine, Execution of Selective Replica Check Failed, DS, Major*
- [17] *Storage Engine, Execution of Selective Replica Check Failed, PLDB, Major*
- [18] *Storage Engine, High Load In DS*
- [19] *Storage Engine, High Load In PLDB*
- [20] *Storage Engine, Memory Usage Too High In DS, Full Threshold Reached*



- [21] *Storage Engine, Memory Usage Too High In DS, Warning Threshold Reached*
- [22] *Storage Engine, Memory Usage Too High In PLDB, Major*
- [23] *Storage Engine, Memory Usage Too High In PLDB, Warning*
- [24] *Storage Engine, No Available Master Replica for DS*
- [25] *Storage Engine, No Available Master Replica for PLDB*
- [26] *Storage Engine, Out Of Memory In DS*
- [27] *Storage Engine, Out Of Memory In PLDB*
- [28] *Storage Engine, Out Of Tablespace In DS*
- [29] *Storage Engine, Out Of Tablespace In PLDB*
- [30] *Storage Engine, PLDB Cluster Down*
- [31] *Storage Engine, PLDB Cluster In Maintenance Mode*
- [32] *Storage Engine, PLDB Cluster Node Down*
- [33] *Storage Engine, Potential Data Inconsistency between Replicas Found in DS*
- [34] *Storage Engine, Potential Data Inconsistency between Replicas Found in PLDB*
- [35] *Storage Engine, Replication Channels Down in DS*
- [36] *Storage Engine, Replication Channels Down in PLDB*
- [37] *Storage Engine, Replication Delay Too High In DS*
- [38] *Storage Engine, Replication Delay Too High In PLDB*
- [39] *Storage Engine, Replication Stopped Working in DS*
- [40] *Storage Engine, Replication Stopped Working in PLDB*
- [41] *Storage Engine, Restore Fault in DS*
- [42] *Storage Engine, Restore Fault in PLDB*
- [43] *Storage Engine, Tablespace Usage Too High In DS, Warning*
- [44] *Storage Engine, Tablespace Usage Too High In PLDB, Warning*
- [45] *Storage Engine, Temporary Data Inconsistency*



- [46] *Storage Engine, Unable to Synchronize Cluster in DS, Major*
- [47] *Storage Engine, Unable to Synchronize Cluster in DS, Warning*
- [48] *Storage Engine, Unable to Synchronize Cluster in PLDB, Major*
- [49] *Storage Engine, Unable to Synchronize Cluster in PLDB, Warning*
- [50] *Storage Engine, Unrepaired Data Inconsistency between Replicas, PLDB*
- [51] *Storage Engine, Unrepaired Data Inconsistency between Replicas, DS*
- [52] *Server Platform, Storage Performance Degradation Detected*
- [53] *LDAP Front End, High Load in LDAP Processing Layer*
- [54] *LDAP Front End, Processing Capacity Below Minimum*
- [55] *LDAP Front End, Processing Redundancy Lost*
- [56] *LDAP Front End, Server Down*
- [57] *Operating System, Disk Usage Too High*
- [58] *Operating System, Server Configuration Backup Fault*
- [59] *Control, Automatic Master Election Locked Down*
- [60] *Control, Blackboard Coordination Cluster Down*
- [61] *Control, Blackboard Coordination Server Down*
- [62] *Control, Messaging Service Cluster Down*
- [63] *Control, Messaging Service Server Down*
- [64] *Control, Potential Split Brain Detected*
- [65] *Control, Remote Node Unreachable*
- [66] *Control, Remote Site Unreachable*
- [67] *Application Counters, Fault In Subscriber Statistic Application*
- [68] *SAF, AMF Component Cleanup Failed*
- [69] *SAF, AMF Component Instantiation Failed*
- [70] *SAF, AMF SI Unassigned*
- [71] *SAF, CLM Cluster Node Unavailable*
- [72] *SAF, LOTC Disk Replication Communication Failed*



- [73] *SAF, LOTC Disk Replication Consistency Failed*
- [74] *SAF, LOTC Ethernet Bonding Failed*
- [75] *SAF, LOTC Memory Usage Failed*
- [76] *SAF, LOTC Time Synchronization Failed*
- [77] *Security, OAM User Exceeded Number Of Failed Logins*
- [78] *Security, OAM User Gaining Privilege Failed*
- [79] *Security, OAM User Privilege Raise To Root Failed*
- [80] *Security, Root Login Failed*
- [81] *Preventive Maintenance, Logchecker Found Error(s)*
- [82] *Licensing, Autonomous Mode Activated*
- [83] *Licensing, Capacity Usage Threshold Reached, Major*
- [84] *Licensing, Capacity Usage Threshold Reached, Warning*
- [85] *Licensing, Key File Fault*
- [86] *Licensing, License Key Not Available, Major*
- [87] *Licensing, License Key Not Available, Minor*
- [88] *Licensing, License Manager Not Available*
- [89] *SOAP Notifications, Discarded Notifications*
- [90] *SOAP Notifications, Endpoint Unreachable*
- [91] *CUDB Consistency Check*
- [92] *CUDB Glossary of Terms and Acronyms*

Other Ericsson Documents

- [93] *ESA Fault Management*
- [94] *ESA Setup and Configuration*

Other Documents and Online References

- [95] *Information Technology - Open Systems Interconnection - Systems Management Alarm Reporting Function ITU-T X.733. CCITT Rec. X.733 (1992 E) <http://www.itu.int/rec/T-REC-X.733/>*