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NETWORK MANAGEMENT SYSTEM

-USE CASES

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USE CASE 1

Use Case Name: Adding a new EMS to NMS

Scope: Network Management System (NMS)

Level: User-goal

Actors:

- User (Primary)
- NMS (Supporting)
- EMS (Supporting)

Stakeholders and Interests:

- **User** –A Network Engineer who wants to add a new EMS to the NMS by entering an API address.
- **NMS**- Wants to register a EMS to itself and receive alarms generated by EMS.
- **EMS**-Wants to generate Alarms when a network fault occurs and alert the NMS through a XML formatted file.
- **System Administrator**- Wants to provide access to only legitimate Users to register new EMS by managing their User accounts and deals with any unresolved issues.

Preconditions:

1. User (Network Engineer) has authorized access to the NMS.
2. All EMS are registered using an API address.
3. EMS is configured with required network devices (Switches, Routers, etc.) to generate alarms through an XML file during a fault.

Post-conditions:

1. A new EMS is successfully registered with the NMS.

Main Success Scenario:

1. User log in to the Network Management System.
2. NMS grants access to the User by validating its credentials.
3. User generates a new API address.
4. The User registers a new EMS with this API address.
5. The new EMS connects with the NMS.
6. User receives an acknowledgement of successful registration of EMS with the NMS.
   User repeats step 3-6 until indicates done.
7. User log out from the Network Management System.
8. The System updates the activity logs of the entire session.

Extensions (or Alternate flows):

*a. At any point of time the system fails:
To support recovery and correct functioning of the system, ensure all EMS registration states can be recovered and handled from any step of the scenario.
1-7a. NMS generates an alert and displays the Error.
2. User restarts the system, log in again and view the Activity logs.
2a. User is not able to log in:

1. User contacts the Network administrator to provide access to system

3. User is unable to generate API address.
   3a. System gives error if same API already exists and asks for a different API address.
   3b. User can view the Configuration file for correct API format and view the existing APIs.
   3c. User can request the administrator to check for any unresolved issues.

4-6a. System is unable to connect a new EMS:
   1. System deletes the previous unsuccessful entry of EMS-API.
   2. User can view the Configuration and activity logs of the NMS to rectify errors.
   3. System asks the user to try again and displays an array of possible solutions.

7. The User cannot logout:
   7a. The user restarts the System.
   7b. View the activity logs to current session login and logout times.

8. The Activity Logs are not getting updated:
   8a. User can restart the system and login again.
   8b. User can contact the Network Administrator and request action for any unresolved issues.

Special Requirements:

- The User is a well experienced Network Engineer aware of all functionalities of the System.
- The System generates graphical and text models of the System for better understanding and manageability.
- The EMS must be configured with different network devices capable of generating an Alarm.

USE CASE 2

Use Case Name: Receive Priority Based Alarms

Scope: Network Management System (NMS)

Level: User-goal

Actors:

- NMS (Primary)
- User (Secondary)
- EMS (Supporting)

Stakeholders and Interests:

- **EMS**- Wants to generate Alarm when a fault occurs and send it to the NMS in a XML file format.
- **NMS**- Wants to receive alarms from the EMS and direct them to the User terminal after assigning priority to them, giving highest priority to the most critical alarm.
- **User** –A Network Engineer who wants to check priority based alarms on a terminal that are received from the NMS and take necessary actions.
- **System Administrator**- Wants to manage User accounts and provide access to only legitimate users and deal with any unresolved System issues.

Preconditions:

1. User (Network Engineer) has authorized access to the NMS.
2. EMS is configured with required network devices (Switches, Routers, etc.) to generate alarms through an XML file during a fault.
3. All EMS use same format to store Real-time faults as XML files.
4. NMS should be able to process the XML file and convert it into viewable format for the User.

Post-conditions:

1. User can view all alarms received in a priority based manner and take necessary action.

Main Success Scenario:

1. A fault occurs in the network in real-time.
2. EMS detects the faults in real time.
3. EMS generates an alarm and send it to the NMS as an XML file.
4. NMS receives all alarms from different EMS.
5. NMS processes each XML file and extracts information from it.
6. NMS prioritizes each alarm depending on its criticality and sends it to the User.
7. User logs in to the System at any time, and view list of all alarms in a prioritized sequence.
8. The User takes the required action to resolve the faults.
9. The Users log out of the System.

Extensions (or Alternate flows):

*a. At any point of time the system fails:
To support recovery and correct functioning of the system, ensure all EMS alarms are generated and reported in real time. Any unprocessed state can be recovered and handled from any step of the scenario.

1. NMS generates an alert and displays the Error.
2. The System should keep track of all activities and maintain the Activity log.

2a. Fault occurs but EMS cannot detect it in real time:

1. System generates error and reports to the user.

2b. User restarts the system, log in again and view the Activity logs.

3-4a. NMS fails to receive the alarm sent by EMS:

1. EMS retries to send alarm in the XML file.
2. System reports to the user on multiple fail attempts.

5a. NMS is unable to process the XML file correctly:

1. System gives a second attempt to process the file.

   1a. Multiple attempts to process the file fails:

   1. The System notifies the user for any necessary action to be taken.

6a. System is unable to prioritize in the correct sequence:

1. System review its activity log and attempts to create the right priority.
2. System notifies the user.

7a. User is unable to check the list of faults on the terminal:

1. User check the activity logs for alarms received.
2. User requests the NMS to review the alarms received.
3. User restarts the system.

Special Requirements:

- The System generates graphical and text models of the Faults for better understanding and manageability.

Technology and Data Variations List:

- The EMS uses a XML converter to store data correctly in XML format.
- The NMS uses an efficient XML processor to extract information correctly from XML formatted file.

USE CASE 3

Use Case Name: Storing Alarms as Records in Database

Scope: Network Management System (NMS)

Level: User-goal

Actors:

- NMS (Primary)
- User (Secondary)
- EMS (Supporting)

Stakeholders and Interests:

- **User:** A Network Engineer who wants to get recorded all the alarm activities in the database which are received from EMS by NMS.
- **NMS:** Wants to process XML file and store important information concerning the Alarm in the database.
- **System Administrator**- Wants to manage User accounts and provide access to only legitimate users and deal with any unresolved System issues.

Preconditions:

1. The System must be connected to the Database which will store important information pertaining to Alarm.
2. The XML file that NMS received contains alarm information and use correct format.
3. The NMS should be able to process the XML file
4. User (Network Engineer) has authorized access to the NMS and store Alarms in the Database

Post-conditions:

1. The NMS processes the XML file and records the alarm’s important information successfully.
2. Database responds to the NMS with a successful message.

Main Success Scenario:

1. NMS receives the XML file with the alarm information from the EMS
2. NMS processes the XML file and extracts important alarm information.
3. NMS opens connection to the Database.
4. The NMS sends the extracted alarm’s information to the Database
5. Database receives the alarm record with important information.
6. The information gets stored in the Database in real time
7. The Database gives a response to the NMS on successful insertion of alarm information.
8. NMS closes the connection to the database.

Extensions (or Alternate flows):

*a. At any point of time the system fails:

To support recovery and correct functioning of the system, ensure Database is connected. Any incorrect query or incorrect result can be handled from any step of the scenario.

1. System generates an alert and displays the Error.
2. The System should keep track of all activities and maintain the Activity log.

2a. NMS is unable to process the XML file correctly.

1. System gives a second attempt to process the file and extract information.

    1a. Multiple attempts to process the file fails:

    1. The System notifies the user for any necessary action to be taken.

3a. NMS cannot connect to the regular database:

1. System retries to connect to database.

    1a. Multiple attempts to database fails:

    1. System reports to User on multiple unsuccessful connection attempts.
    2. NMS attempts to connect to a Back-up redundant database.

5-6a. Database in unable to store the information successfully:

1. Databases requests the NMS to send the record again.

    1a. Insert Alarm query is incorrect:

    1. Database gives error to the NMS and presents suggestions of valid requests.

Special Requirements:

- System is connected to a database (through an interface) that stores records consisting of reported alarms to the NMS.
- The System has valid credentials to access the Database.
- The Database is efficient in inserting large records.
- Provision of Back-up redundant database for reliability of system and consistency of database.

Technology and Data Variations List:

- The NMS uses an efficient XML processor to extract information correctly from XML formatted file.
- The Database can be MySQL which offers high performance, security and is platform independent.

USE CASE 4

Use Case Name: Generate Report on Alarm Activities

Scope: Network Management System (NMS)

Level: User-goal

Actors:

- User (Primary)
- System (Supporting)

Stakeholders and Interests:

- **User:** A Network Engineer who wants to generate report of all the alarm activities over a given period.
- **System:** Allows user to extract required information from the database and generate the report in a PDF file for the user.
- **System Administrator**- Wants to manage User accounts and provide access to only legitimate users and deal with any unresolved System issues.

Preconditions:

1. The System must always be connected to the Database that stores and returns the results consisting of reported alarms over a given period as requested by the User.
2. User (Network Engineer) has authorized access to the NMS and query the Database.
3. NMS stores the alarms correct information in the correct sequence.

Post-conditions:

1. The User generates a PDF report of all alarm activities over a given time frame.

Main Success Scenario:

1. The User requests the System to generate a report of Alarm activities over a given time period.
2. System checks connection to the Database and sends request to the Database.
3. Database filters all the alarm entries in the requested period.
4. The Database sends the filtered results to the System.
5. The System receives the filtered entries from the database and creates a PDF by parsing each entry.
6. System presents the generated PDF report file to the User.
7. The User saves the PDF file and logs off the System.
8. The use case ends successfully.

Extensions (or Alternate flows):

*a. At any point of time the system fails:

To support recovery and correct functioning of the system, ensure all Database is connected. Any incorrect query or incorrect result can be handled from any step of the scenario.

1. System generates an alert and displays the Error.
2. The System should keep track of all activities and maintain the Activity log.

1a. Database request is not valid:

1. System shows error in requested query message and presents suggestions of valid requests.

2a. Database is down or connection is lost in between and cannot receive query:

1. System retries to connect to database.

2. System reports of User on multiple unsuccessful connection attempts.

2b. System cannot connect to the regular database:

1. System tries to connect to a Back-up redundant database.

4a. Database finds 0 record in the given time frame:

1. System fetches the record from Back-up database.

1a. No Record is available in backup database:

1. User is presented ‘No Records Found Message’ and no PDF is generated.

5a. System receive alarm information from the database but cannot generate a PDF report:

1. System retries to generate PDF file and present it to User.
2. Error is generated and reported to User on multiple failed attempts.

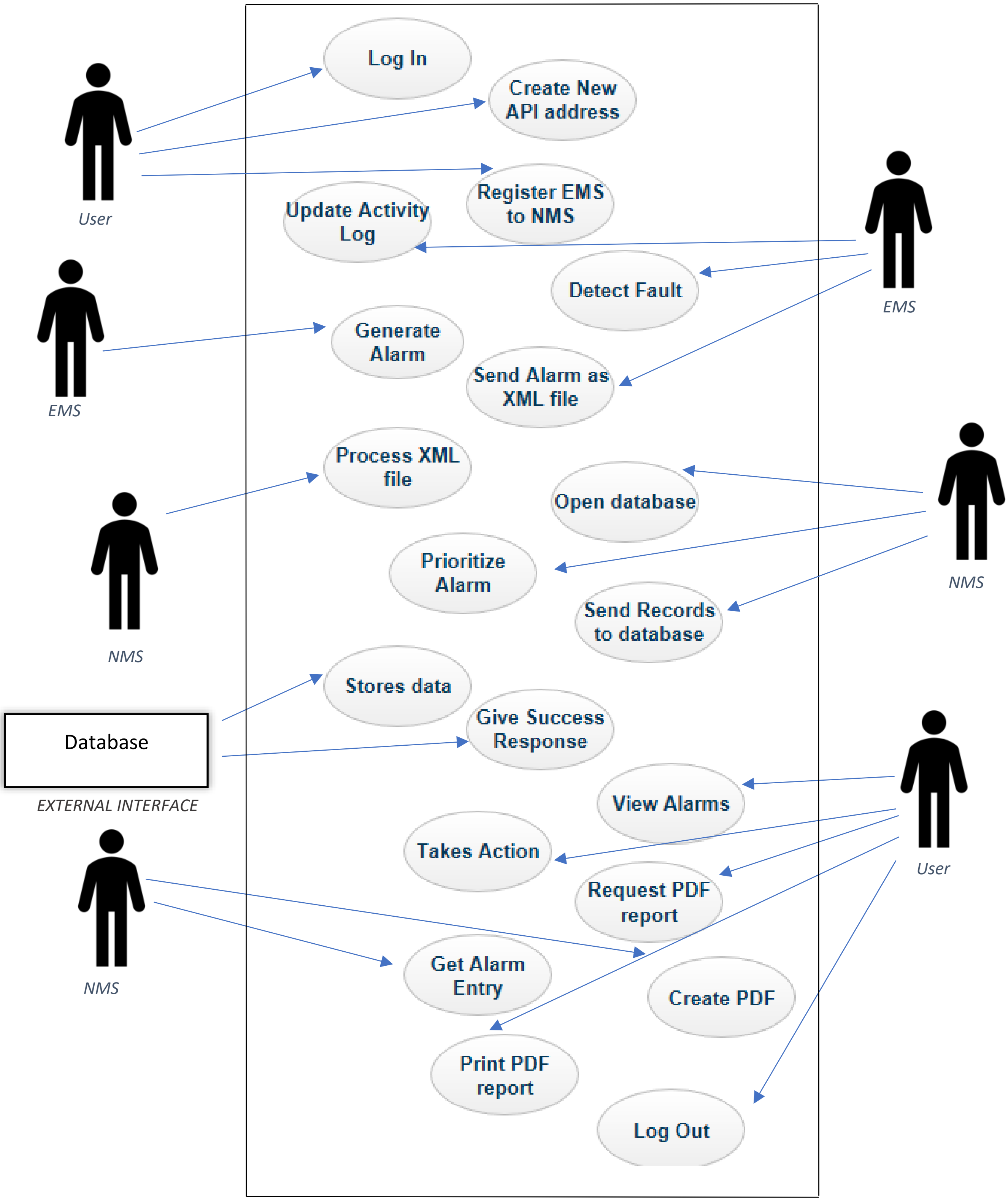
Special Requirements:

- The System must be connected to the Database that returns the results consisting of reported alarms over a given period as requested by the User.
- The System has valid credentials to access the Database.
- The System also generates graphical representation of the Faults in the report for System analysis.
- The Database is efficient in querying large records.
- Provision of Back-up redundant database for reliability of system and consistency of database.

Technology and Data Variations List:

- The System uses an efficient PDF file creator to convert database result set into a PDF file format file.
- The Database can be MySQL which offers high performance, security, and is platform independent.

NETWORK MANAGEMENT SYSTEM-
USE-CASE DIAGRAM


Log In
Create New API address
Register EMS to NMS
Update Activity Log
Detect Fault
Generate Alarm
Send Alarm as XML file
Process XML file
Open database
Prioritize Alarm
Send Records to database
Stores data
Give Success Response
View Alarms
Takes Action
Request PDF report
Get Alarm Entry
Create PDF
Print PDF report
Log Out
User
EMS
EMS
NMS
NMS
Database
EXTERNAL INTERFACE
NMS
User