

Superviseur - Collecteur

1.0

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Chapitre 1

KVMSuperviseur

Le superviseur est une suite de trois logiciels permettant de monitorer des machines virtuelles tournant sous Linux-KVM.

Il contient un daemon qui se charge de récupérer les données sur l'hyperviseur et sur ses machines virtuelles.

Il contient aussi un collecteur qui se charge de récupérer les données en provenance des daemons puis de les renvoyer aux afficheurs connectés.

L'afficheur se connecte à un collecteur pour pouvoir visualiser l'état de santé des hyperviseurs et de leurs machines virtuelles.

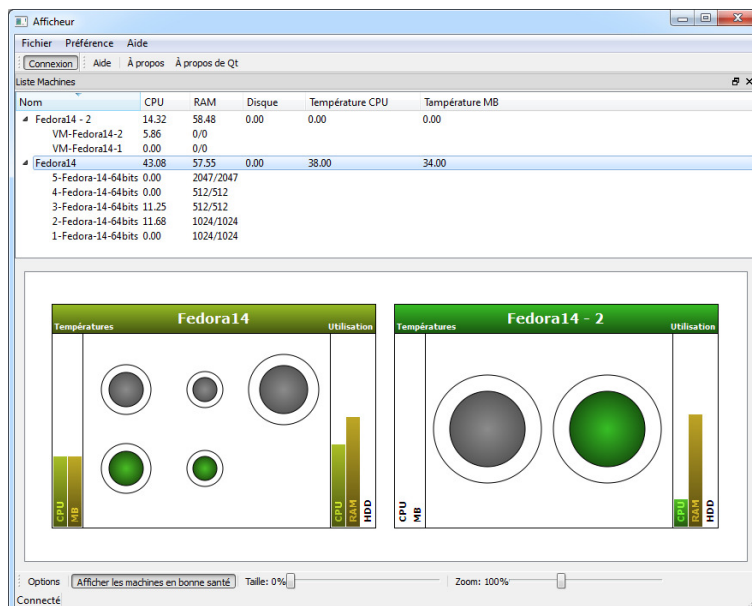


FIGURE 1.1 – Capture d'écran de l'afficheur

1.1 License

KVMSuperviseur et ses logiciels sont distribués sous les termes de la licence [GNU GPL](#).

1.2 Plateformes

Le daemon est codé en Python et est prévu pour fonctionner sur Linux.

Le collecteur et l’afficheur devraient fonctionner sur toutes les plateformes supportées par [Qt](#) ≥ 4.7 .

1.3 Installation

Pour compiler le collecteur et l’afficheur il faut disposer des bibliothèques de [Qt](#) ≥ 4.7 .

La bibliothèque [QJson](#) est également nécessaire.

Pour effectuer la compilation vous devez vous placer dans le répertoire de l’application puis exécuter les commandes suivantes :

```
qmake  
make
```

1.4 Crédits :

Auteur :

Schaub Lionel

Chapitre 2

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Version 3, 29 June 2007

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```

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Chapitre 3

Liste des choses à faire

Classe `AfficheurSocketThread` Ajouter la possibilité à l'afficheur d'envoyer des commandes permettant d'accéder à des données contenues dans la base de données.

Classe `GestionBDD` Ajouter la possibilité de récupérer des données.

Membre `GestionBDD : :executerRequete(QString reqStr, QStringList listeColonnes, QList< QVariantM`
Récupérer automatiquement la liste des colonnes de la table.
Renvoyer l'objet `QSqlQuery` pour que l'appelant puisse récupérer les résultats.

Chapitre 4

Index des classes

4.1 Liste des classes

Liste des classes, structures, unions et interfaces avec une brève description :

AfficheurSocket (Gère les demandes de connexion des afficheurs)	21
AfficheurSocketThread (Gère une connexion à un afficheur)	24
GestionBDD (Cette classe s'occupe de créer et gérer les accès à la base de données)	26
HyperviseurUDPSocket (Gère l'acquisition des données UDP en provenance des daemons)	30

Chapitre 5

Index des fichiers

5.1 Liste des fichiers

Liste de tous les fichiers avec une brève description :

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afficheursocketthread.h	36
gestionbdd.cpp	37
gestionbdd.h	38
hyperviseurudpsocket.cpp	39
hyperviseurudpsocket.h	40
main.cpp	41

Chapitre 6

Documentation des classes

6.1 Référence de la classe AfficheurSocket

Gère les demandes de connexion des afficheurs.

```
#include <afficheursocket.h>
```

Connecteurs publics

- void [receptionDonnees](#) (QString donnees)
Reçoit les données en provenance du signal HyperviseurUDPSocket : :nouvellesDonnees().

Signaux

- void [nouvellesDonnees](#) (QString donnees)
Émis lorsqu'une donnée est reçue d'un daemon.

Fonctions membres publiques

- [AfficheurSocket](#) (quint16 port=56000, QObject *parent=0)
Constructeur.

Fonctions membres protégées

- void [incomingConnection](#) (int socketDescriptor)
S'occupe des demandes de connexion.

6.1.1 Description détaillée

Gère les demandes de connexion des afficheurs. Cette classe attend les connexions des afficheurs.

Pour chaque demande de connexion un thread dédié à cette connexion est créé.

Attention

Pour que les données puissent être relayées aux afficheurs connectés il faut connecter le slot `receptionDonnees(QString donnees)` au signal `HyperviseurUDP-Socket : :nouvellesDonnes(QString donnees)`.

Définition à la ligne 14 du fichier `afficheursocket.h`.

6.1.2 Documentation des constructeurs et destructeur

6.1.2.1 `AfficheurSocket : :AfficheurSocket (quint16 port = 56000, QObject * parent = 0) [explicit]`

Constructeur.

Le constructeur crée un socket TCP en écoute sur le port spécifié en paramètre

Paramètres

port le numéro du port.

parent permet de spécifier le classe parente.

Définition à la ligne 10 du fichier `afficheursocket.cpp`.

6.1.3 Documentation des fonctions membres

6.1.3.1 `void AfficheurSocket : :incomingConnection (int socketDescriptor) [protected]`

S'occupe des demandes de connexion.

Cette méthode est appelée à chaque fois qu'une demande de connexion est effectuée.

Elle crée un objet `AfficheurSocketThread` et un thread, puis elle déplace cet objet dans le nouveau thread.

Le signal `nouvellesDonnees(QString donnees)` est ensuite relié au slot `AfficheurSocketThread : :receptionDonnees(QString donnees)`.

Pour finir, l'exécution du thread est lancée.

Paramètres

socketDescriptor le numéro du port.

Définition à la ligne 25 du fichier `afficheursocket.cpp`.

6.1.3.2 void AfficheurSocket : :nouvellesDonnees (QString *donnees*) [signal]

Émis lorsqu'une donnée est reçue d'un daemon.

Ce signal est émis à chaque fois qu'une donnée en provenance d'un daemon est reçue.

Note

Ce signal permet de relayer les données en provenance du signal [HyperviseurUDPSocket : :nouvellesDonnees\(QString *donnees*\)](#) aux threads qui s'occupent de la connexion avec un afficheur.

Paramètres

donnees contient les données (au format JSON).

6.1.3.3 void AfficheurSocket : :receptionDonnees (QString *donnees*) [slot]

Reçoit les données en provenance du signal [HyperviseurUDPSocket : :nouvellesDonnees\(\)](#).

Ce slot doit être connecté au signal [HyperviseurUDPSocket : :nouvellesDonnees\(\)](#) pour que les données puissent être relayées aux afficheurs connectés.

Paramètres

donnees contient les données (au format JSON).

Définition à la ligne 41 du fichier `afficheursocket.cpp`.

La documentation de cette classe a été générée à partir des fichiers suivants :

- [afficheursocket.h](#)
- [afficheursocket.cpp](#)

6.2 Référence de la classe AfficheurSocketThread

Gère une connexion à un afficheur.

```
#include <afficheursocketthread.h>
```

Connecteurs publics

- void [receptionDonnees](#) (QString donnees)
Envoie les données à l’afficheur.

Fonctions membres publiques

- [AfficheurSocketThread](#) (int socketDescriptor, QObject *parent=0)
Constructeur.

6.2.1 Description détaillée

Gère une connexion à un afficheur. Cette classe s’occupe de gérer la communication entre le collecteur et un afficheur.

Elle retransmet les données en provenance des daemons à l’afficheur.

À faire

Ajouter la possibilité à l’afficheur d’envoyer des commandes permettant d’accéder à des données contenues dans la base de données.

Définition à la ligne 16 du fichier afficheursocketthread.h.

6.2.2 Documentation des constructeurs et destructeur

6.2.2.1 AfficheurSocketThread : :AfficheurSocketThread (int *socketDescriptor*, QObject **parent* = 0) [explicit]

Constructeur.

Le constructeur s’approprie la gestion du socket spécifié en paramètre.

Il planifie sa destruction lorsque sa connexion sera rompue.

Avertissement

Le paramètre parent ne devrait pas être spécifié sinon la classe ne pourra pas fonctionner dans un thread.

Paramètres

socketDescriptor l’identificateur du socket.

parent permet de spécifier le classe parente.

Définition à la ligne 12 du fichier afficheursocketthread.cpp.

6.2.3 Documentation des fonctions membres

6.2.3.1 void AfficheurSocketThread : :receptionDonnees (QString *donnees*) [slot]

Envoie les données à l’afficheur.

Ce slot envoie les données à l’afficheur.

Paramètres

donnees contient les données (au format JSON).

Définition à la ligne 29 du fichier afficheursocketthread.cpp.

La documentation de cette classe a été générée à partir des fichiers suivants :

- [afficheursocketthread.h](#)
- [afficheursocketthread.cpp](#)

6.3 Référence de la classe GestionBDD

Cette classe s'occupe de créer et gérer les accès à la base de données.

```
#include <gestionbdd.h>
```

Connecteurs publics

- void [ajouterDonnees](#) (QString donnees)
Ajoute les données JSON dans la base de données.

Fonctions membres publiques

- [GestionBDD](#) (QObject *parent=0)
Constructeur.
- [~GestionBDD](#) ()
Destructeur.

Connecteurs privés

- void [sauvegarderBDD](#) ()
Déplace le contenu de la base de données sur le disque dur.

Fonctions membres privées

- void [creerBDD](#) ()
Crée la structure de la base de données.
- bool [verifierErreur](#) (QString requete)
Vérifie si la dernière requête a renvoyé une erreur.
- QVariant [executerRequete](#) (QString reqStr, QStringList listeColonnes, QList<QVariantMap > liste)
Exécute une requête SQL préparée.

Attributs privés

- QSqlDatabase [bdd](#)
Cette propriété représente la base de données.

6.3.1 Description détaillée

Cette classe s'occupe de créer et gérer les accès à la base de données.

À faire

Ajouter la possibilité de récupérer des données.
Définition à la ligne 29 du fichier gestionbdd.h.

6.3.2 Documentation des constructeurs et destructeur

6.3.2.1 GestionBDD : :GestionBDD (QObject *parent = 0) [explicit]

Constructeur.

Le constructeur crée la base de données en mémoire et effectue certaines vérifications des fonctions supportées.

Paramètres

parent permet de spécifier le classe parente.
Définition à la ligne 9 du fichier gestionbdd.cpp.

6.3.2.2 GestionBDD : :~GestionBDD ()

Destructeur.

Ferme la base de données si elle est ouverte puis supprime la base de données.

Définition à la ligne 39 du fichier gestionbdd.cpp.

6.3.3 Documentation des fonctions membres

6.3.3.1 void GestionBDD : :ajouterDonnees (QString donnees) [slot]

Ajoute les données JSON dans la base de données.

Ce slot parse les données JSON puis les ajoute à la base de données grâce à la méthode [executerRequete\(\)](#).

Note

Les données sont ajoutées dans une transaction pour garantir leur intégrité.

Paramètres

donnees contient les données (au format JSON).
Définition à la ligne 53 du fichier gestionbdd.cpp.

6.3.3.2 void GestionBDD : :creerBDD () [private]

Crée la structure de la base de données.

Cette méthode crée la structure de la base de données si elle n'existe pas déjà.

Elle crée les tables, les relations et les indexs.

Définition à la ligne 167 du fichier gestionbdd.cpp.

6.3.3.3 QVariant GestionBDD : :executerRequete (QString reqStr, QStringList listeColonnes, QList< QVariantMap > liste) [private]

Exécute une requête SQL préparée.

Cette méthode exécute la requête spécifiée en paramètre pour chaque élément de la liste passée en paramètre.

La liste des colonnes est générée automatiquement.

Les colonnes disponibles dans la table doivent être passées sous forme d'une liste dans le paramètre listeColonnes.

Chaque élément dans le premier QVariantMap de la liste est ajouté à la liste de colonnes si sa clef est présente dans la liste des colonnes de la table.

La requête doit avoir le placeholder 1 placé à l'endroit où devrait être notée la liste des colonnes et le placeholder 2 à l'endroit où devraient être notées les valeurs.

Exemple :

```
listeColonnes << "name" << "time" << "cputemp" << "mbtemp" << "cpu" << "ram" << "
disk" << "network";
QVariant id = executerRequete("INSERT INTO InfosHyperviseurs(%1) VALUES(%2)", lis
teColonnes, liste);
```

Attention

La liste des colonnes est générée à partir du premier élément de la liste. Il est donc indispensable que tous les éléments de la liste contiennent les mêmes clefs.

À faire

Récupérer automatiquement la liste des colonnes de la table.

Renvoyer l'objet QSqlQuery pour que l'appelant puisse récupérer les résultats.

Paramètres

reqStr la requête avec les deux placeholders.

listeColonnes la liste de colonne de la table.

liste liste contenant des tableaux associatifs avec les valeurs pour chaque requête.

Renvoie

l'id du dernier élément inséré.

Définition à la ligne 116 du fichier gestionbdd.cpp.

6.3.3.4 void GestionBDD : :sauvegarderBDD () [private, slot]

Déplace le contenu de la base de données sur le disque dur.

Ce slot déplace le contenu de la base de données de la mémoire au disque dur.

Note

Les données sont copiées sur le disque et supprimées de la mémoire dans une transaction pour garantir leur intégrité.

Définition à la ligne 225 du fichier gestionbdd.cpp.

6.3.3.5 bool GestionBDD::verifierErreur (QSqlQuery *requete*) [private]

Vérifie si la dernière requête à renvoyé une erreur.

Cette méthode vérifie si la dernière requête a renvoyé une erreur. Si tel est le cas, il recompose la requête, l’affiche et affiche l’erreur.

Note

Cette méthode est prévue pour fonctionner avec des requêtes préparées.

Paramètres

requete objet représentant la requête.

Renvoie

true si il y a eu une erreur dans la dernière requête sinon false.

Définition à la ligne 293 du fichier gestionbdd.cpp.

6.3.4 Documentation des données membres**6.3.4.1 QSqlDatabase GestionBDD::bdd [private]**

Cette propriété représente la base de données.

Définition à la ligne 50 du fichier gestionbdd.h.

La documentation de cette classe a été générée à partir des fichiers suivants :

- [gestionbdd.h](#)
- [gestionbdd.cpp](#)

6.4 Référence de la classe HyperviseurUDPSocket

Gère l'acquisition des données UDP en provenance des daemons.

```
#include <hyperviseurudpsocket.h>
```

Signaux

- void [nouvellesDonnes](#) (QString donnees)
Émis lorsqu'une donnée est reçue d'un daemon.
- void [paquetsPerdus](#) (int nb)
Émis lorsque des paquets n'ont pas été reçus.

Fonctions membres publiques

- [HyperviseurUDPSocket](#) (quint16 port=55000, QObject *parent=0)
Constructeur.

Connecteurs privés

- void [lireDatagrammes](#) ()
Lit les messages (datagrammes) en attente de lecture.

Attributs privés

- QHash< QString, quint32 > [seqNbTable](#)
Cette table de hachage stocke le numéro de séquence du dernier paquet reçu pour chaque IP.

6.4.1 Description détaillée

Gère l'acquisition des données UDP en provenance des daemons. Cette classe s'occupe de gérer l'acquisition et l'extraction des données contenues dans des paquets UDP en provenance des daemons.

Elle gère également la détection des paquets perdus grâce au numéro de séquence.

Deux signaux permettent de transmettre ces informations à d'autres classes.

Avertissement

Si vous souhaitez placer cette classe dans un thread il ne faut pas définir de parent.

Définition à la ligne 15 du fichier hyperviseurudpsocket.h.

6.4.2 Documentation des constructeurs et destructeur

6.4.2.1 HyperviseurUDPSocket : :HyperviseurUDPSocket (quint16 *port* = 55000, QObject * *parent* = 0) [explicit]

Constructeur.

Le constructeur crée un socket UDP en écoute sur le port spécifié en paramètre.

Paramètres

port le numéro du port.

parent permet de spécifier le classe parente.

Définition à la ligne 10 du fichier hyperviseurudpsocket.cpp.

6.4.3 Documentation des fonctions membres

6.4.3.1 void HyperviseurUDPSocket : :lireDatagrammes () [private, slot]

Lit les messages (datagrammes) en attente de lecture.

Cette méthode lit les datagrammes en attente de lecture.

Elle vérifie le numéro de séquence pour déterminer si des paquets ont été perdus.

Si l'adresse ip n'est pas connue, elle est ajoutée à seqNbTable.

Les données sont ensuite extraites puis converties en String et le signal [nouvelles-Donnes\(QString donnees\)](#) est émis.

Définition à la ligne 25 du fichier hyperviseurudpsocket.cpp.

6.4.3.2 void HyperviseurUDPSocket : :nouvellesDonnes (QString *donnees*) [signal]

Émis lorsqu'une donnée est reçue d'un daemon.

Ce signal est émis à chaque fois qu'une donnée en provenance d'un daemon est reçue.

Paramètres

donnees contient les données (au format JSON).

6.4.3.3 void HyperviseurUDPSocket : :paquetsPerdus (int *nb*) [signal]

Émis lorsque des paquets n'ont pas été reçus.

Ce signal est émis à chaque fois qu'un ou plusieurs paquets sont perdus. La perte d'un paquet est détectée lorsque le numéro de séquence ne correspond pas au dernier numéro reçu plus un.

Note

Si le numéro de séquence est égal à zéro le signal n'est pas émis car cela est considéré comme un redémarrage du daemon.

Si le daemon n'est pas encore connu (aucun paquet n'a été reçu en provenance de cet IP) le signal n'est pas émis, peu importe le numéro de séquence.

Si le numéro de séquence est plus petit que le précédent le signal n'est pas émis. Cela se produit généralement lorsqu'un paquet a pris un chemin plus long et est arrivé après son suivant.

Avertissement

Un numéro de séquence est sauvegardé par adresse IP, par conséquent si il y a plusieurs daemon sur une adresse IP des paquets perdus seront signalés à tort.

Paramètres

nb le nombre de paquets perdus.

6.4.4 Documentation des données membres

6.4.4.1 QHash<QString, quint32> HyperviseurUDPSocket : :seqNbTable [private]

Cette table de hachage stocke le numéro de séquence du dernier paquet reçu pour chaque IP.

Définition à la ligne 48 du fichier hyperviseurudpsocket.h.

La documentation de cette classe a été générée à partir des fichiers suivants :

- [hyperviseurudpsocket.h](#)
- [hyperviseurudpsocket.cpp](#)

Chapitre 7

Documentation des fichiers

7.1 Référence du fichier afficheursocket.cpp

```
#include "afficheursocket.h"  
#include <QTcpServer>  
#include <QThread>  
#include <QTcpSocket>  
#include <QHostAddress>
```

7.2 Référence du fichier afficheursocket.h

```
#include <QTcpServer>
#include "afficheursocketthread.h"
```

Classes

- class [AfficheurSocket](#)
Gère les demandes de connexion des afficheurs.

7.3 Référence du fichier afficheursocketthread.cpp

```
#include "afficheursocketthread.h"
```

7.4 Référence du fichier afficheursocketthread.h

```
#include <QThread>
#include <QTcpSocket>
#include <QHostAddress>
```

Classes

- class [AfficheurSocketThread](#)
Gère une connexion à un afficheur.

7.5 Référence du fichier gestionbdd.cpp

```
#include "gestionbdd.h"  
#include <QObject>  
#include <QSqlError>  
#include <QSqlQuery>  
#include <QSqlDriver>  
#include <QSqlRecord>  
#include <QSqlDatabase>  
#include <QStringListIterator>  
#include <QCoreApplication>  
#include <QMapIterator>  
#include <QVariantMap>  
#include <QVariant>  
#include <QDateTime>  
#include <QTimer>  
#include <QDebug>  
#include "qjson/parser.h"
```

7.6 Référence du fichier gestionbdd.h

```
#include <QObject>
#include <QSqlError>
#include <QSqlQuery>
#include <QSqlDriver>
#include <QSqlRecord>
#include <QSqlDatabase>
#include <QStringListIterator>
#include <QCoreApplication>
#include <QMapIterator>
#include <QVariantMap>
#include <QVariant>
#include <QDateTime>
#include <QTimer>
#include <QDebug>
#include "qjson/parser.h"
```

Classes

- class [GestionBDD](#)
Cette classe s'occupe de créer et gérer les accès à la base de données.

Macros

- #define [NOM_BDD](#) "collecteur"

7.6.1 Documentation des macros

7.6.1.1 #define NOM_BDD "collecteur"

Définition à la ligne 21 du fichier gestionbdd.h.

7.7 Référence du fichier hyperviseurudpsocket.cpp

```
#include "hyperviseurudpsocket.h"  
#include <QUdpSocket>  
#include <QDebug>
```

7.8 Référence du fichier hyperviseurudpsocket.h

```
#include <QUdpSocket>  
#include <QDebug>
```

Classes

- class [HyperviseurUDPSocket](#)
Gère l'acquisition des données UDP en provenance des daemons.

7.9 Référence du fichier main.cpp

```
#include <QtCore/QCoreApplication>
#include <QStringList>
#include <QThread>
#include <QRegExp>
#include "hyperviseurudpsocket.h"
#include "afficheursocket.h"
#include "gestionbdd.h"
```

Fonctions

- int `main` (int argc, char *argv[])
 Point d'entrée du programme.

7.9.1 Documentation des fonctions

7.9.1.1 int main (int argc, char * argv[])

Point d'entrée du programme.

La fonction main se charge d'instancier les classes [HyperviseurUDPSocket](#), [AfficheurSocket](#) et [GestionBDD](#).

Elle connecte ensuite le signal [HyperviseurUDPSocket : :nouvellesDonnes\(QString donnees\)](#) aux slots [AfficheurSocket : :receptionDonnees\(QString\)](#) et [GestionBDD : :ajouterDonnees\(QString\)](#).

Elle gère également les paramètres de la ligne de commande.

Paramètres

- argc* le nombre d'arguments.
- argv* tableau contenant les arguments.

Renvois

Le code de retour du programme. Vaut 0 si le programme s'est terminé correctement.

Définition à la ligne 19 du fichier main.cpp.

7.10 Référence du fichier mainpage.dox

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