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Pentaho, Linux, and Microsoft Active Directory Authentication with Kerberos

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Finalization Checklist .... **Error! Bookmark not defined.**

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Overview

Many enterprises require that all their connections to different databases be authenticated through a Kerberos ticket. This applies to all JDBC-based connections such as `hibernate`, `quartz`, and `jackrabbit`. This also applies to solution connections, which are configured in the `context.xml`, through **Manage Data Sources** in the Pentaho User Console (PUC), and in a job or a transformation.

Some of the topics discussed here include Windows authentication, Kerberos, Microsoft SQL Server, Linux, `kinit`, `klist`, and the Pentaho Servers.

The intention of this document is to speak about topics generally; however, these are the specific versions covered here:

Software	Version(s)
Pentaho	6.x, 7.x

The Components Reference in Pentaho Documentation has a complete list of supported software and hardware.

Before You Begin

Before beginning, use the following information to prepare for the procedures described in the main section of the document.

You will need:

1. A Pentaho Server that is running in a Linux environment.
2. An active directory (AD) domain controller that is reachable by both the database and the Pentaho server.
3. A database configured correctly to accept connections with Kerberos tickets from the domain controller.
4. A JDBC driver that is used to connect to the database supports Kerberos authentication.
5. One single AD user with access to all the required databases.
6. The user running the Pentaho Server to be able to create a Kerberos ticket through `kinit` with the credentials for the enabled user.
7. A valid ticket with an external tool that generates and renews the ticket when needed.

All tests and examples were developed to connect to the MS SQL Server 2012 R2. For other databases, follow the instructions provided by its documentation on configuring the JDBC properties, such as class, URL, etc.

Setting Up the Domain Controller and SQL Server

In this section, we will go over the steps to set up your domain controller (Active Directory) and SQL server.

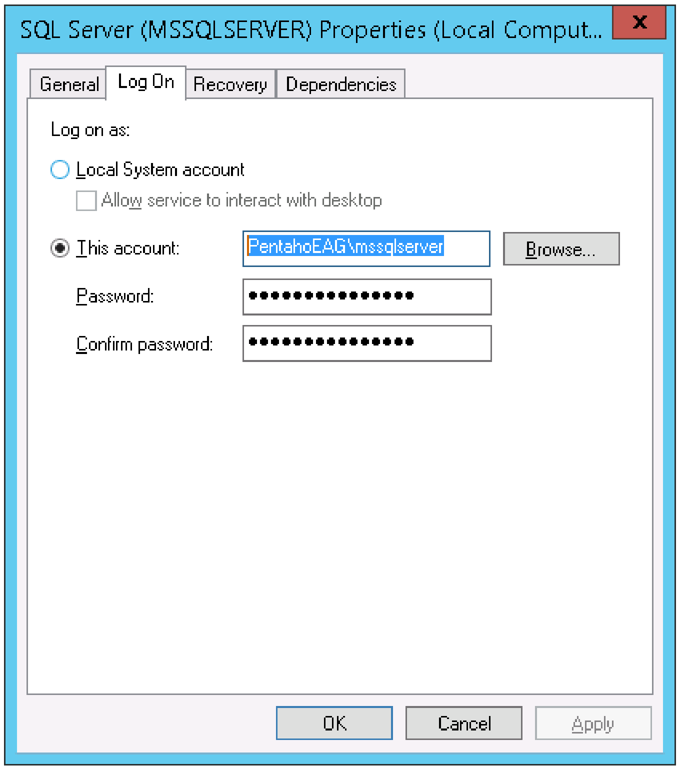
You can find details on these topics in the following sections:

- Configuring Domain Controller
- Configuring Linux and Pentaho
- Configuring Pentaho Data Integration (PDI) Connection

Configuring Domain Controller

Make sure that the hostname is the same as the one used in the `setspn` command (either host only or FQDN), or the connection will fail with a ***Defective token detected (Mechanism level: AP_REP token id does not match!)*** *error.*

1. Install and configure the domain controller and SQL server to work together:


SQL Server (MSSQLSERVER) Properties (Local Comput...

Log on as:

( ) Local System account

[ ] Allow service to interact with desktop

(●) This account: PentahoEAG\mssqlserver

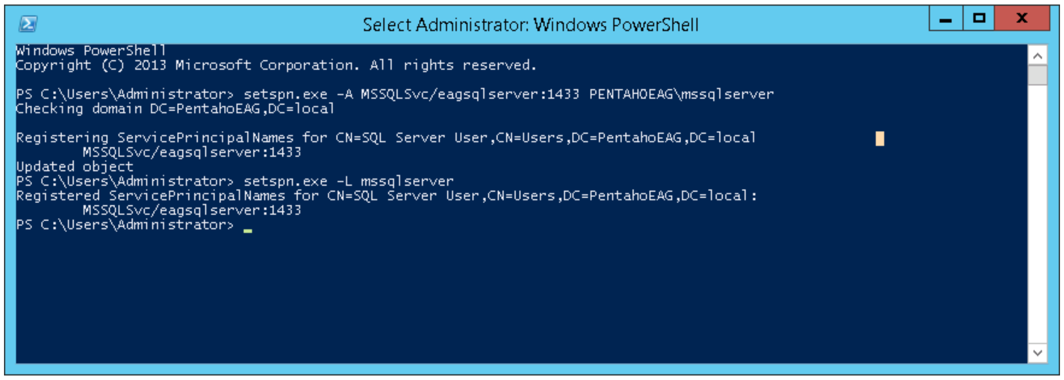
Password: •••••••••••••••

Confirm password: •••••••••••••••

Figure 1: SQL Server Properties

2. In the domain controller, create a service principal name (SPN) with the `setspn.exe` utility, with the AD user running the SQL server service and its `hostname`. Be sure to configure your client with the same information.

```
setspn.exe –A MSSQLSvc/eagsqlserver:1433 PENTAHOEAG\mssqlserver
setspn.exe –L mssqlserver
```



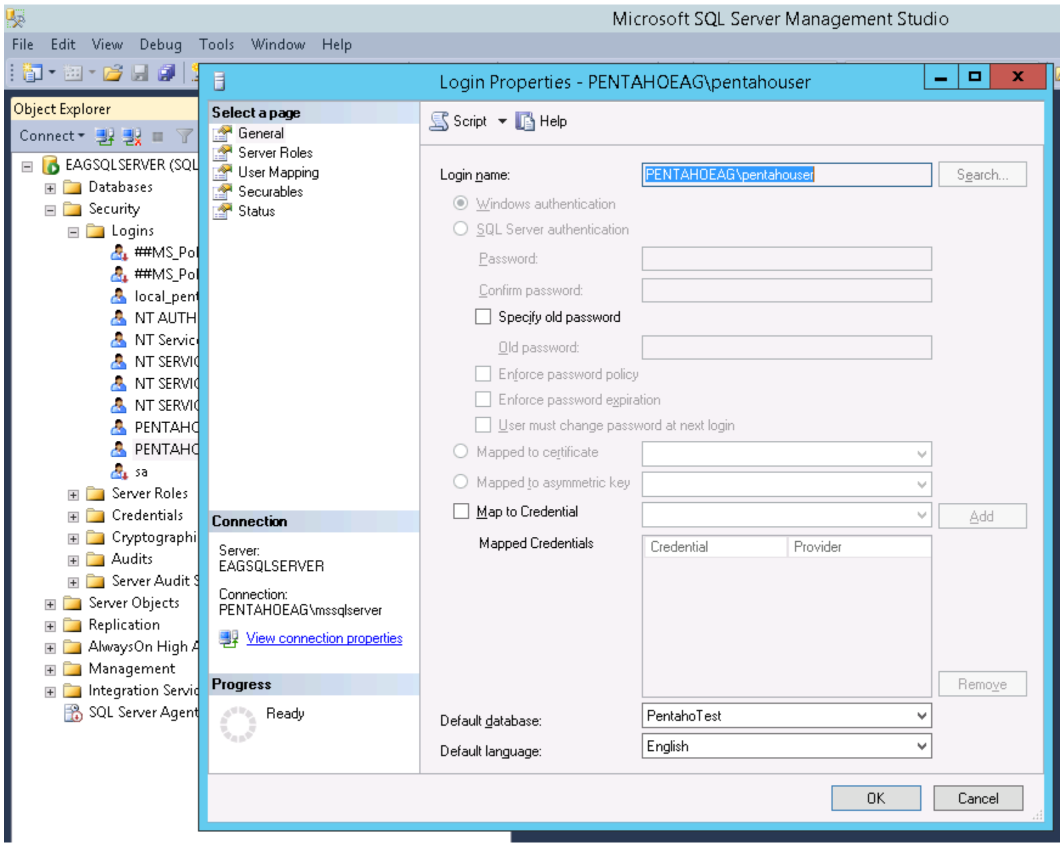
```
Windows PowerShell
Copyright (C) 2013 Microsoft Corporation. All rights reserved.

PS C:\Users\Administrator> setspn.exe -A MSSQLSvc/eagsqlserver:1433 PENTAHOEAG\mssqlserver
Checking domain DC=PentahoEAG,DC=local

Registering ServicePrincipalNames for CN=SQL Server User,CN=Users,DC=PentahoEAG,DC=local
        MSSQLSvc/eagsqlserver:1433
Updated object
PS C:\Users\Administrator> setspn.exe -L mssqlserver
Registered ServicePrincipalNames for CN=SQL Server User,CN=Users,DC=PentahoEAG,DC=local:
        MSSQLSvc/eagsqlserver:1433
PS C:\Users\Administrator> _
```

Figure 2: `setspn` Utility

3. Create a new login in the SQL server for the AD user who has access to the data sources.
4. Create six databases. Make sure the new login is the owner of all the Pentaho Server databases: `jackrabbit`, `hibernate`, and `quartz`.



Login name: PENTAHOEAG\pentahouser

[✓ Windows authentication]
SQL Server authentication
Password:
Confirm password:
☐ Specify old password
Old password:
☐ Enforce password policy
☐ Enforce password expiration
☐ User must change password at next login
Mapped to certificate
Mapped to asymmetric key
☐ Map to Credential
Mapped Credentials

Credential	Provider

Default database: PentahoTest
Default language: English

Connection
Server: EAGSQLSERVER
Connection: PENTAHOEAG\mssqlserver
View connection properties

Progress
Ready

Figure 3: Database Login Properties

Configuring Linux and Pentaho

1. Download the latest MS SQL Server JDBC driver.
2. Unzip and place the SQL JDBC `.jar` file in the `lib` Pentaho class path:

   Pentaho Server: `pentaho-server/tomcat/lib`

   Client tools (PDI): `data-integration/lib/`
3. Create a `/etc/krb5.conf` file with the details of your domain controller.

```
$ cat /etc/krb5.conf
[libdefaults]
      default_realm = PENTAHOEAG.LOCAL
      dns_lookup_realm = false
      dns_lookup_kdc = false
      ticket_lifetime = 24h
      renew_lifetime = 7d
      forwardable = true

[realms]
      PENTAHOEAG.LOCAL = {
            kdc = 10.100.14.101
            admin_server = 10.100.14.101
      }

[domain_realm]
.pentahoeag.local = PENTAHOEAG.LOCAL
pentahoeag.local = PENTAHOEAG.LOCAL
```

4. Create a new Kerberos ticket with the `kinit` command and run the `klist–e` command to see all encryption types.

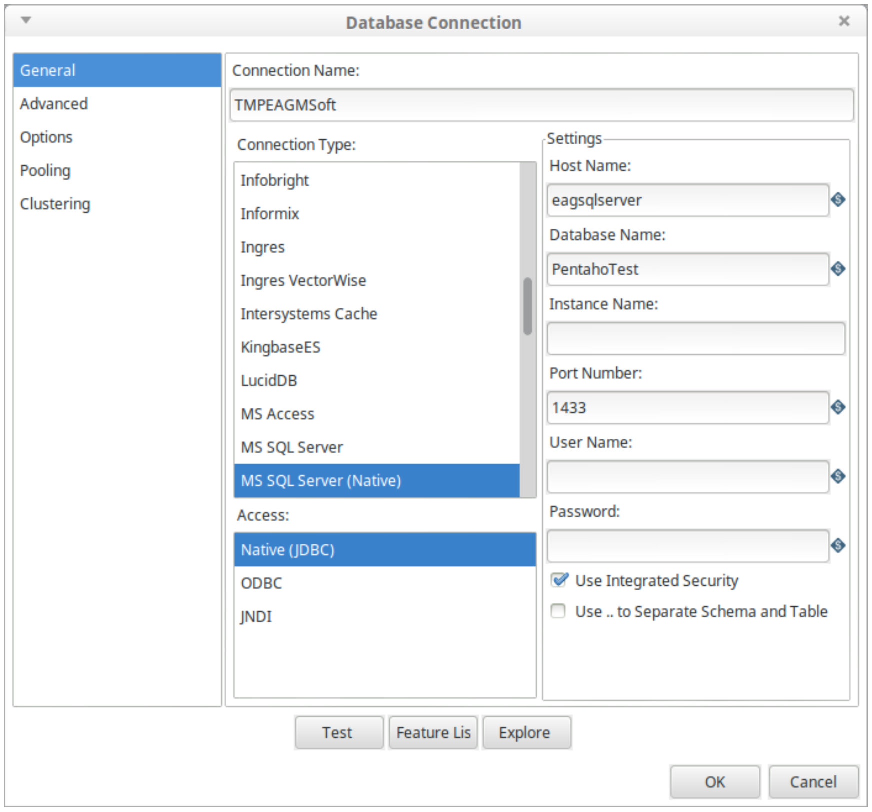
```
$ kinit pentahouser@PENTAHOEAG.LOCAL
Password for pentahouser@PENTAHOEAG.LOCAL:
$ klist -e
Ticket cache: FILE:/tmp/krb5cc_1000
Default principal: pentahouser@PENTAHOEAG.LOCAL

Valid starting       Expires              Service principal
03/15/2016 15:10:42  03/16/2016 01:10:42
krbtgt/PENTAHOEAG.LOCAL@PENTAHOEAG.LOCAL
      renew until 03/22/2016 15:10:39, Etype (skey, tkt): aes256-cts-hmac-
sha1-96, aes256-cts-hmac-sha1-96
```

5. If the encryption type is `aes256 (Etype (skey, tkt): aes256-cts-hmac-sha1-96)`, then Java Cryptography Extension (JCE) unlimited strength is required:
   a. Download the JCE zip file from Oracle.
   b. Back up the `US_export_policy.jar` and `local_policy.jar` from the `lib/security` directory of the Java 8 runtime environment (JRE) (`/usr/lib/jvm/java-8-oracle/jre/lib/security`).
   c. Overwrite the `US_export_policy.jar` and `local_policy.jar` files with the ones included in the `zip` file.

Configuring Pentaho Data Integration (PDI) Connection

1. Make sure a Kerberos ticket is active, and then start PDI.
2. Create a new job or transformation.
3. In the **View** tab, right-click on **Database Connections**, and choose **New**.
4. In the **General** section, create a new database connection. Choose **MS SQL Server (Native)** as the **Connection Type**, and **Native (JDBC)** as the **Access**.
5. Configure the connection with the details listed in the figure and table:



Connection Name: TMPEAGMSoft
Connection Type: MS SQL Server (Native)
Access: Native (JDBC)
Host Name: eagsqlserver
Database Name: PentahoTest
Instance Name:
Port Number: 1433
User Name:
Password:
[✓] Use Integrated Security
[ ] Use .. to Separate Schema and Table

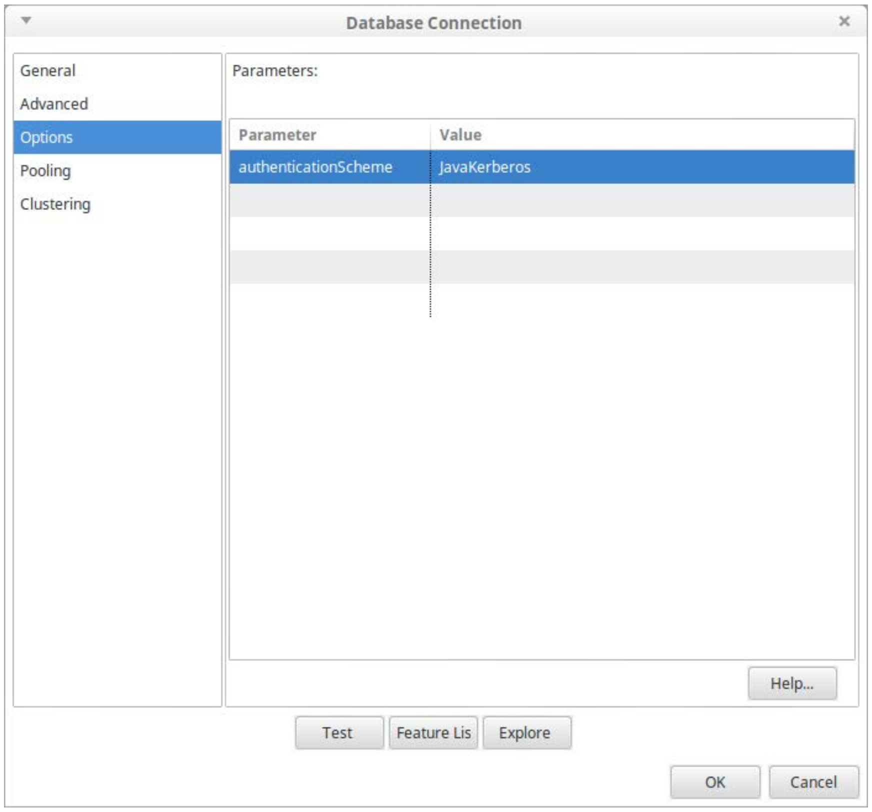
Figure 4: Database Connection General Section

Table 1: Database Connection Details

Field	Details
Host Name	This is the hostname of the SQL server. The hostname must be the same as the one used in the `setspn` command (either `host only` or `FQDN`), or the connection will fail with a "Defective token detected (Mechanism level: AP_REP token id does not match!)" error.
Database Name	This is the name of the database. The user who generated the Kerberos ticket must be able to access this database.
Port Number	Use `1433`, or whatever port you configured in the MS SQL Server.
Instance Name	Leave this blank.
User Name	Leave this blank.
Password	Leave this blank.

Field	Details
Use Integrated Security	Check this box.

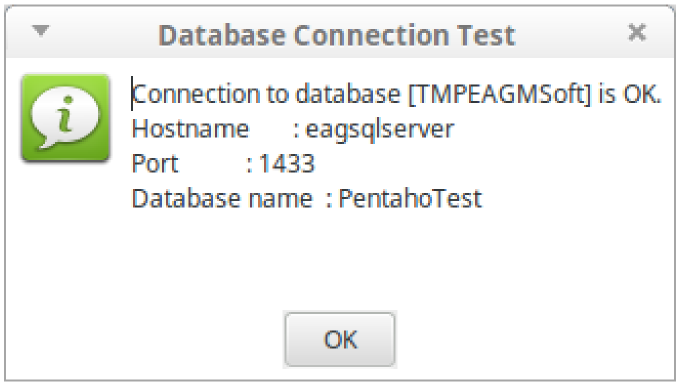
6. Click on the **Options** section, and create a new parameter named `authenticationScheme` with a value of `JavaKerberos`:



Parameter	Value
authenticationScheme	JavaKerberos

Figure 5: Options Tab – New Parameter

7. Click on **Test**. A success message should appear:



```
Connection to database [TMPEAGMSoft] is OK.
Hostname      : eagsqlserver
Port          : 1433
Database name : PentahoTest
```

Figure 6: Database Connection Test

Pentaho Server Configuration

In the following section, you will find instructions to configure your Pentaho Server.

You can find details on the following topics:

- Verifying Database Configuration
- Configuring Pentaho Server's Manage Connections
- Configuring `context.xml`

Verifying Database Configuration

Follow Pentaho's instructions to Use PostgreSQL as Your Repository Database. The changes described below must apply to the standard configuration for MS SQL Server described in the Use MS SQL Server as Your Repository Database documentation.

1. You should have already created the following databases and granted ownership to the AD user who will be using them in the Kerberos ticket:
    a. `jackrabbit`
    b. `quartz`
    c. `hibernate`

Do not run the scripts as explained in this section; `create_jcr_sqlServer.sql` and `create_repository_sqlServer.sql` are not required.

2. Modify `create_quartz_sqlServer.sql` by removing the first `Begin` and `End` block, and add `USE quartz`, before the first `IF EXISTS` statement.
3. Run the `create_quartz_sqlServer.sql` file, as explained in the Pentaho documentation.
4. Open the following files with any text editor:
    a. `pentaho-solutions/system/hibernate/sqlserver.hibernate.cfg.xml`
    b. `pentaho-solutions/system/jackrabbit/repository.xml`
    c. `tomcat/webapps/pentaho/META-INF/context.xml`
5. In all three files, verify the following:
    a. The hostname for the SQL server connection is the same as the one used in the `setspn` command.
    b. Any reference to the connection URL has both the `integratedSecurity=true` and `authenticationScheme=JavaKerberos` properties.

```
jdbc:sqlserver://eagsqlserver:1433;DatabaseName=hibernate;integratedSecurit
y=true;authenticationScheme=JavaKerberos
```

    c. Make sure that any reference to the **username** and **password** for the database connection is set to **empty**.

Configuring Pentaho Server's Manage Connections

Once the Pentaho Server is correctly configured and running, create a new connection through the **Manage Connections** option in the Pentaho User Console (PUC). Here are the steps:

1. Log in to the **PUC**.
2. Go to **File Menu** > **Manage Data Sources**.
3. Add a new connection by clicking on the **Tools** icon (gear icon) and selecting **New Connection**.
4. Create a new database connection with the following details:

Table 2: New Connection Details

Field	Details
Host Name	This is the hostname of the SQL server. The hostname must be the same as the one used in the `setspn` command (either `host only` or `FQDN`), or the connection will fail with a "Defective token detected (Mechanism level: AP_REP token id does not match!)" error.
Database Name	This is the name of the database. The user who generated the Kerberos ticket must be able to access this database.
Port Number	Use `1433`, or whatever port you configured in the MS SQL Server.
Instance Name	Leave this blank.
User Name	Leave this blank.
Password	Leave this blank.
Use Integrated Security	Check this box.

5. Click **Options**, and then create a new parameter named `authenticationScheme` with a value of `JavaKerberos`.

Configuring `context.xml`

1. Stop the Pentaho Server.
2. Open the `context.xml` located in `tomcat/webapps/pentaho/META-INF` for the Pentaho Server or `tomcat/webapps/pentaho-di/META-INF` with any text editor and:
   a. Add the new connection definitions within the `<Context>` tags.
   b. Make sure the hostname for the SQL server connection is the same as the one used in the `setspn` command.
   c. Make sure any reference to the connection URL has both properties set: `integratedSecurity=true` and `authenticationScheme=JavaKerberos`.

```
jdbc:sqlserver://eagsqlserver:1433;DatabaseName=di_hibernate;integratedSecu
rity=true;authenticationScheme=JavaKerberos
```

3. Make sure that any reference to the **username** and **password** for the database connection is set to **empty**.

Related Information

Here are some links to information that you may find helpful while using this best practices document:

- Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files 7 Download
- MS SQL Server JDBC Driver
- Pentaho
    - Components Reference
    - Use MS SQL Server as Your Repository Database
    - Use PostgreSQL as Your Repository Database