Installation Guide

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Getting Started with SAP HANA, express edition (Virtual Machine Method)

Installing SAP HANA, express edition (Virtual Machine)

The SAP HANA, express edition VM image is platform-independent; you can install it to a Windows, OS X, or Linux machine, provided your host machine meets the storage and memory prerequisites. Choose this installation method if you want the simplest setup.

Installing the OVA installs:

- A VM running SUSE Linux Enterprise Server (SLES) for SAP Applications 12 SP1.
- An SAP HANA, express edition instance on the VM, preconfigured and ready to start.

Machine Requirements

Check if your machine has the recommended hardware to successfully install and run the express edition VM image.

JRE 8 - The Download Manager requires JRE 8 or higher. If you are planning to install the SAP HANA, express edition Download Manager for Windows or Linux, you need the 64-bit JRE. If you are planning to install the platform-independent Download Manager, you can use either the 32- or 64-bit JRE. **RAM** - 16 GB RAM recommended.
HDD - 120 GB recommended.
Cores - 2 cores (4 recommended).
Hardware Virtualization - (Intel processors only) For Intel processors, virtualization is a BIOS setting known as either *Intel Virtualization Technology* or *Intel VT*. Go to http://www.intel.com/content/www/us/en/support/processors/000005486.html to determine if your processor is capable of supporting virtualization. If virtualization is turned off on your virtualization-capable machine, consult documentation from your machine vendor on how to enable virtualization technology (or Intel VT) in the BIOS.

Install a Hypervisor

Install a supported hypervisor on your machine if you don't have one already. Hypervisors are software products used for creating and running virtual machines. SAP HANA, express edition has been tested on these hypervisors:

- VMware Player 7.1: https://www.vmware.com/
- VMware Workstation Pro 12.1: https://www.vmware.com/
- VMware Fusion or VMware Fusion Pro 8.x: https://www.vmware.com/
- Oracle VirtualBox: https://www.virtualbox.org/

For the purposes of this tutorial, you will use the VMware Player.

Install VMware Player

VMware Player 7.1 is a hypervisor compatible with SAP HANA express edition. You can install any supported hypervisor, but examples in this tutorial use VMware Player 7.1.

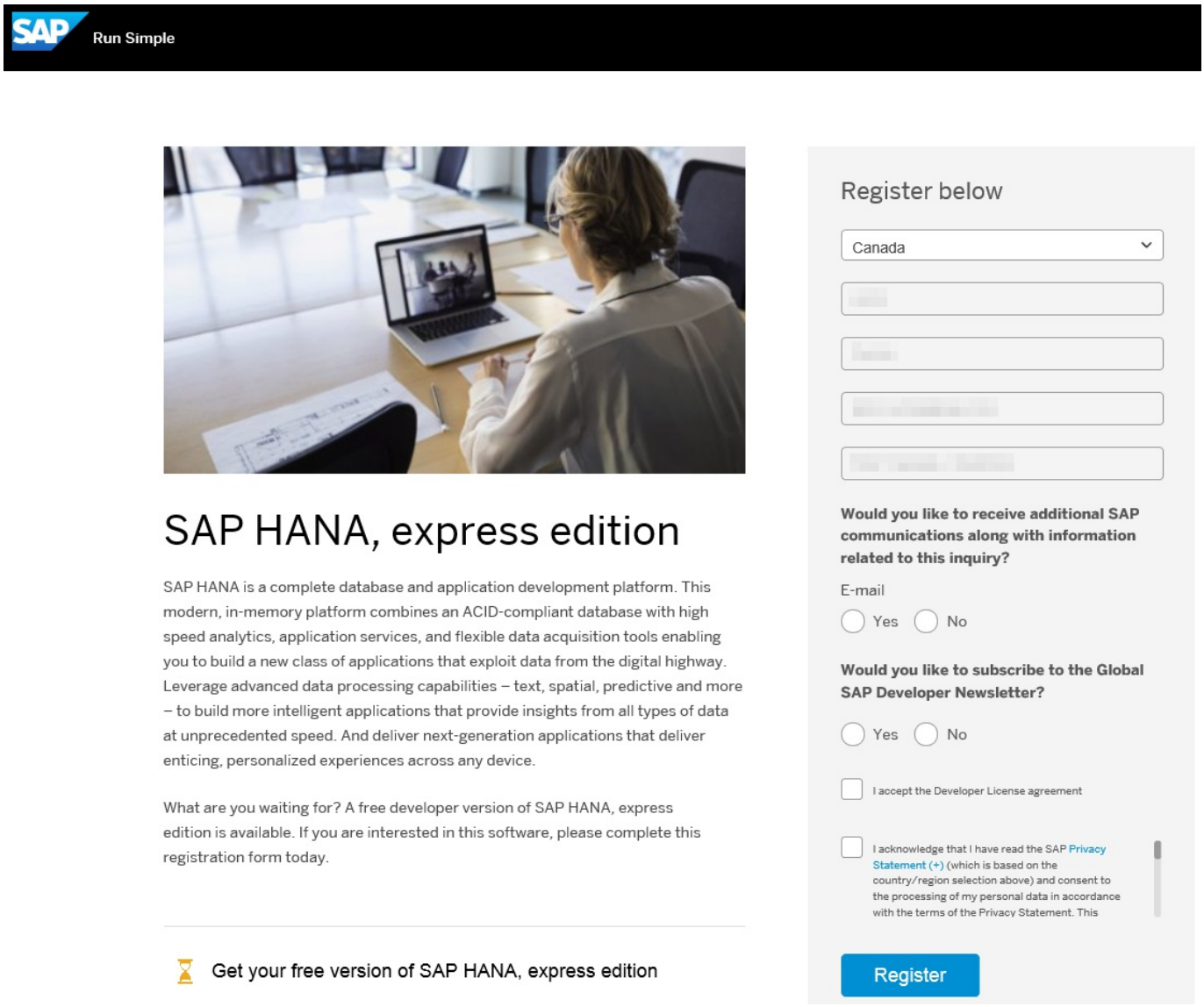
1. Download VMware Player from <www.vmware.com> and run the installer.
2. Ensure you're downloading the correct version for your machine.
3. Register when prompted and follow the setup instructions.

Download the OVA using the Download Manager

Register and then use the Download Manager to download a server-only OVA, or a server-plus-applications OVA. Applications include XS Advanced (XSA) and Web IDE.

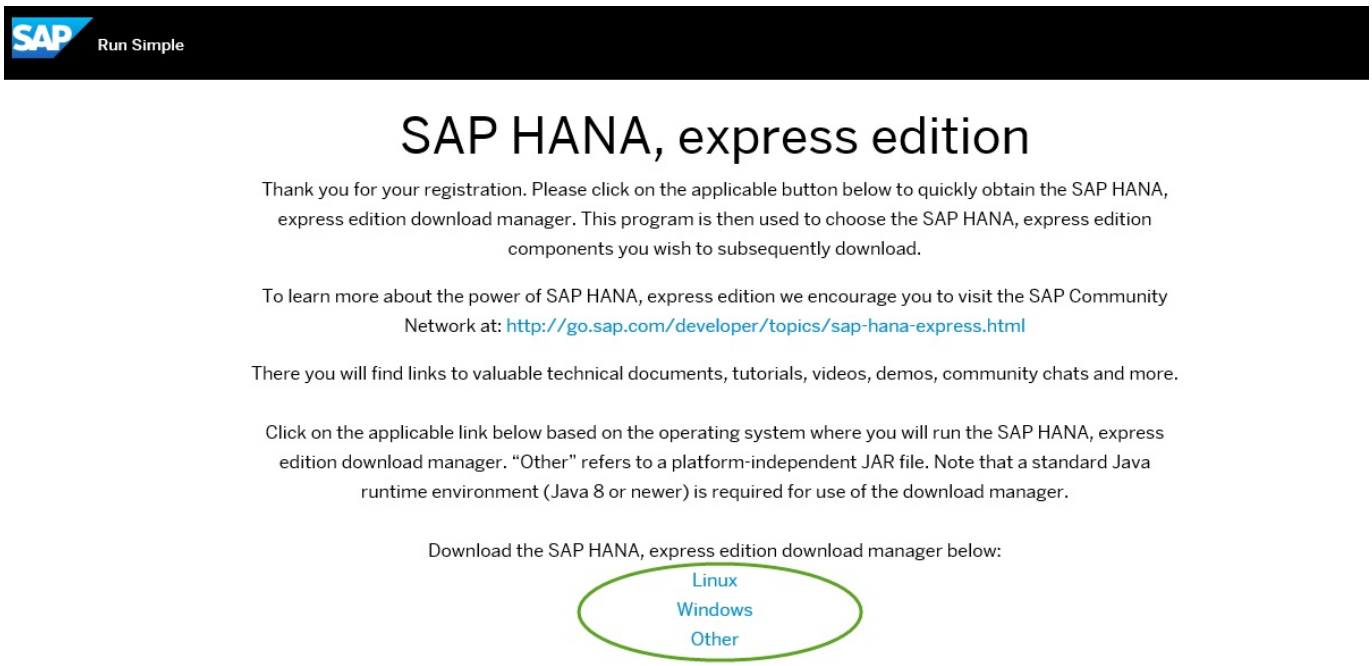
1. Go to the registration page at http://sap.com/sap-hana-express (Alternately, you can go to the SAP HANA, express edition launch page at http://go.sap.com/developer/topics/sap-hana-express.html and click the **Register and download SAP HANA, express edition download manager** link.) The registration page opens.
2. Complete the registration form and click the **Register** button.

> **Note:** If you have an SAP login, click the Login icon at the top of the page to populate the registration form automatically.



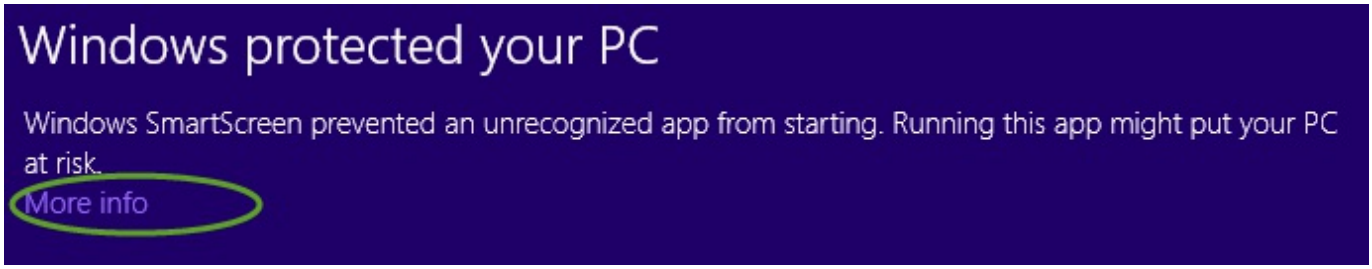
The **Registration Success** page displays. (You will also receive an email indicating successful registration.)

3. At the bottom of the **Registration Success** page, click the download manager that matches your system: Linux or Windows. If you have a Mac, or another type of machine, click "other" for a platform-independent download manager.

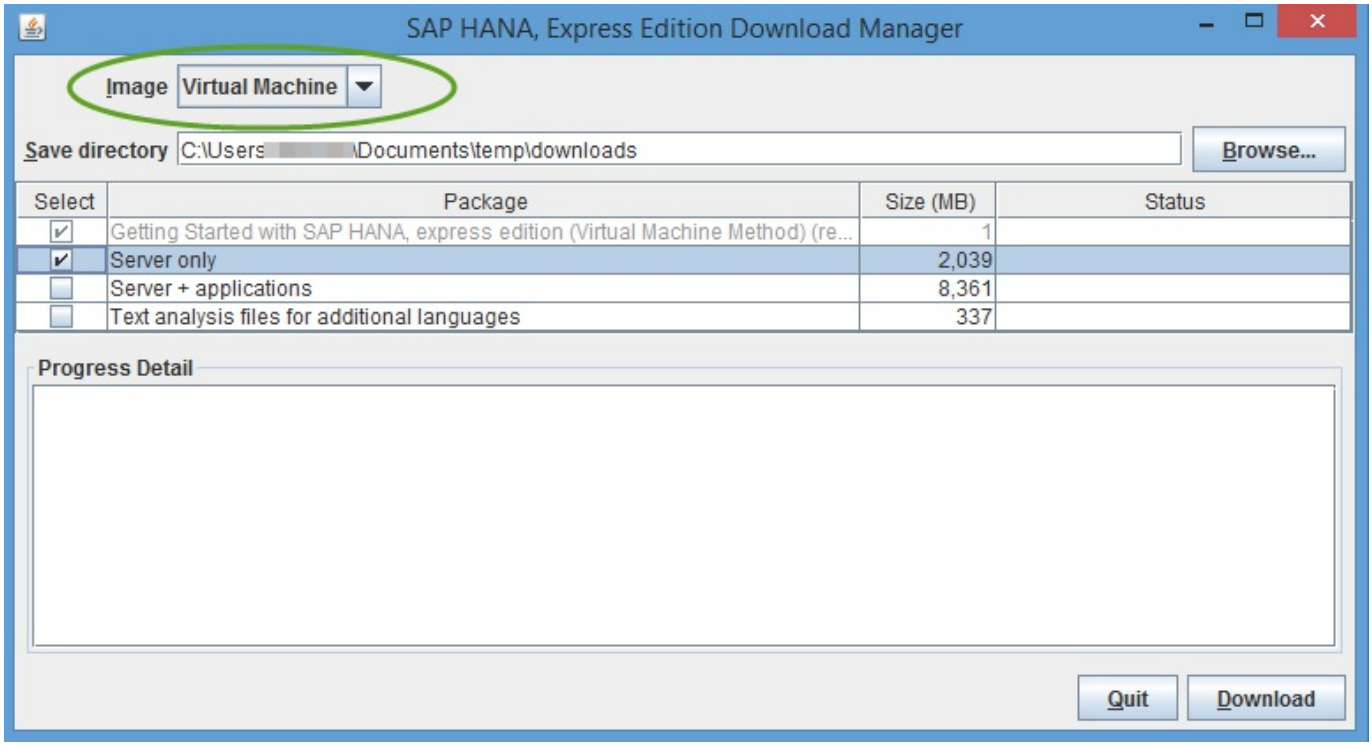


4. Save the download manager installation file to your laptop and open it.

5. If Windows prevents the download manager installation file from running, click **More info** on the warning message and select **Run anyway**.



6. In Download Manager, in the **Image** pull-down, select **virtual machine**.



7. Click **Browse** and select a directory where your downloads will be saved.

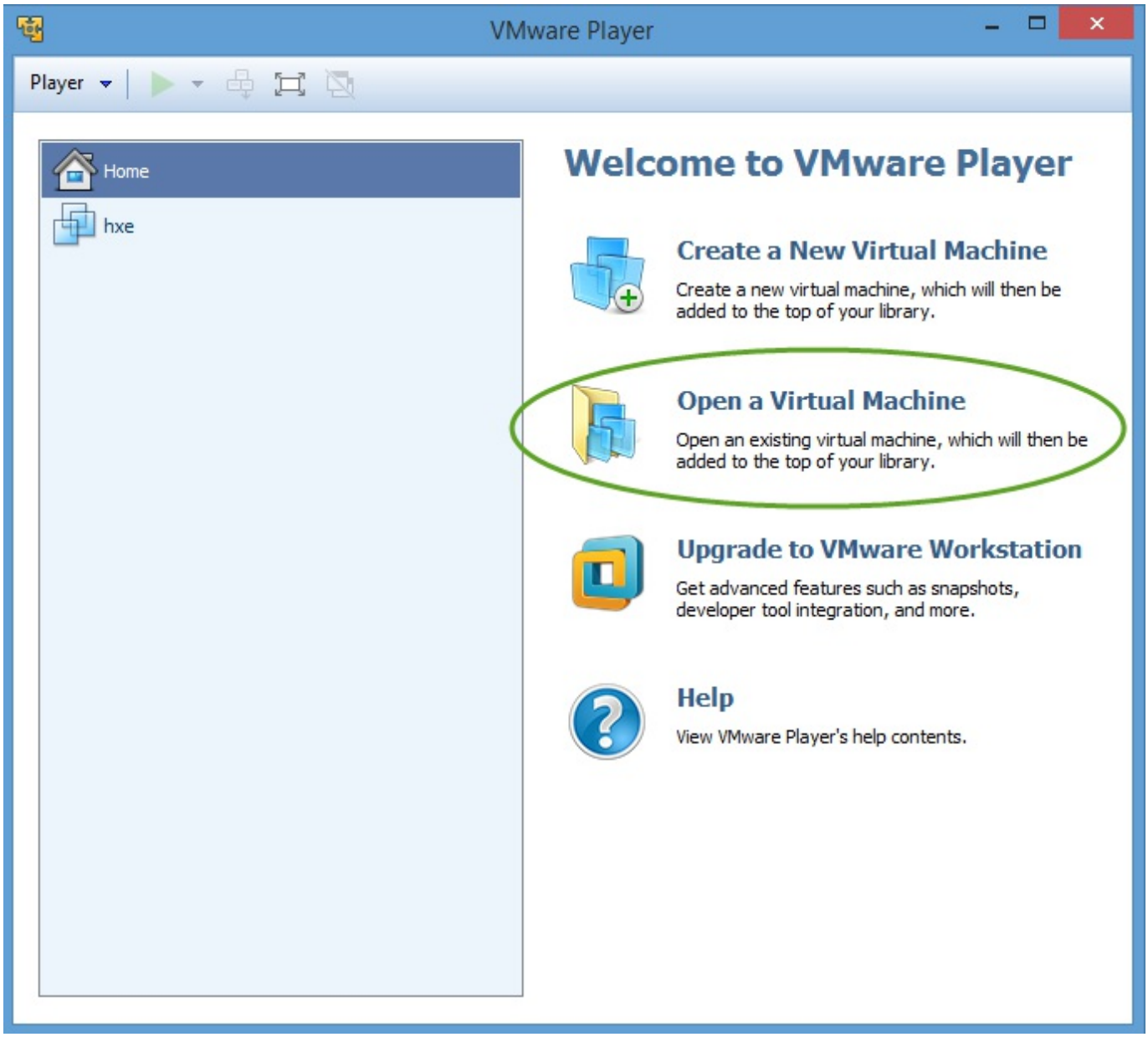
8. Select one or more of the following packages:
   Server only - Downloads `hxe.ova` ; a basic server-only package.
   Server + applications - Downloads `hxexsa.ova` ; the server plus XSA and Web IDE.
   Text analysis files for additional languages - For languages other than English and German, files required for the HANA Text Analysis function. (The text analysis files for English and German are already included in the **Server only** and **Server + applications** packages.)

9. Click the **Download** button.

Import the OVA into VMWare Player

Import the downloaded OVA file into your hypervisor to begin using SAP HANA, express edition.

1. Start VMware Player 7.1 and select *Open a Virtual Machine*.

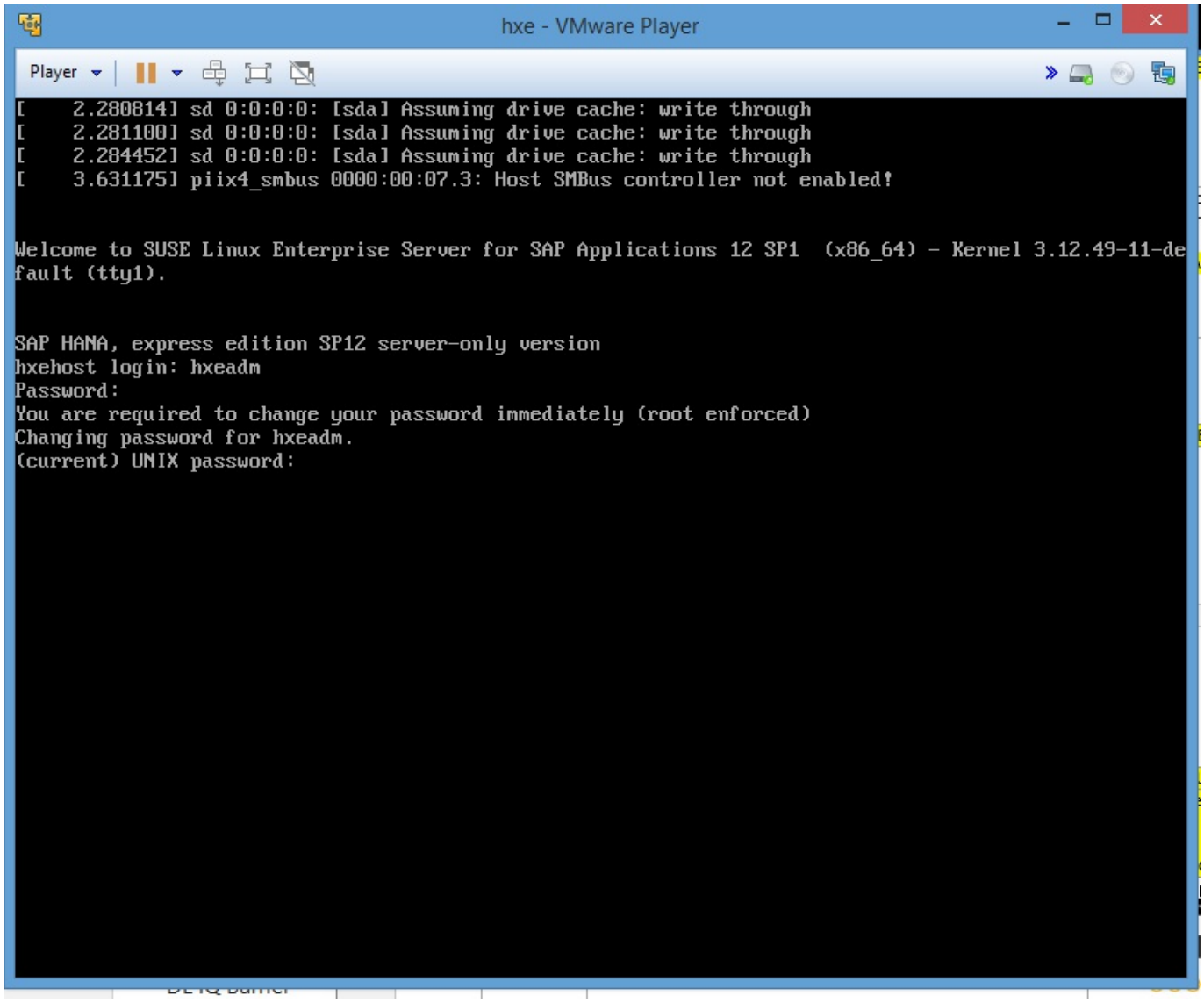


2. Browse to the OVA file you downloaded and click **Open**. The Import Virtual Machine dialog box displays.
3. Accept the defaults and click **Import**. The VM imports. The import process takes approximately 5 minutes.
4. Power on your VM.

Getting Started with SAP HANA, express edition

Start SAP HANA, express edition

1. Start the hypervisor and power on (or click **Play** on) your express edition VM.
2. At the **hxehost login** prompt, enter `hxeadm`
3. For **Password** enter the temporary password `HXEHana1`



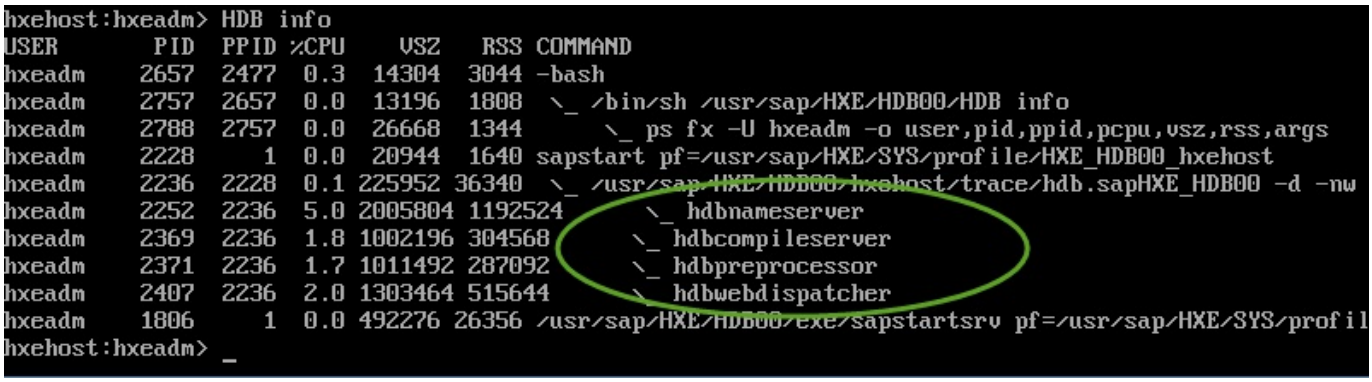
4. When prompted for **current (UNIX) password**, enter the temporary password again: `HXEHana1`
5. When prompted for **New password**, enter a strong password with at least 8 characters. If your password is not strong enough, the system logs you off and you must log in again.
   Tip: Your strong password should contain numbers, upper and lower case letters, and special characters. It cannot contain systematic values, like strings in ascending or descending numerical or alphabetical order.
   Strong password example: `5342_E#1_GcbaFd!`
   Note: Do not use this password example, since it is public and not secure. This example is for illustrative purposes only and must not be used on your system. Define your own strong password.
6. When prompted to **Retype new password**, enter your strong password again.

SAP HANA, express edition is now running.

Test your Server Installation

Verify that all required SAP HANA, express edition services are running properly.

1. From the command prompt, enter:
   HDB info
   You should see the following services:
   `hdbnameserver`
   `hdbcompileserver`
   `hdbpreprocessor`
   `hdbwebdispatcher`
   `hdbdiserver` (server plus applications (`hxexsa.ova`) only)
   Multiple `/hana/shared/HXE/xs/` services (server plus applications (`hxexsa.ova`) only)



2. If you don't see these services, restart the database.
   Enter: **HDB stop** then **HDB start**
   Wait approximately 60 seconds for the system to start and the user prompt to return.

Change the Default Password for SYSTEM User

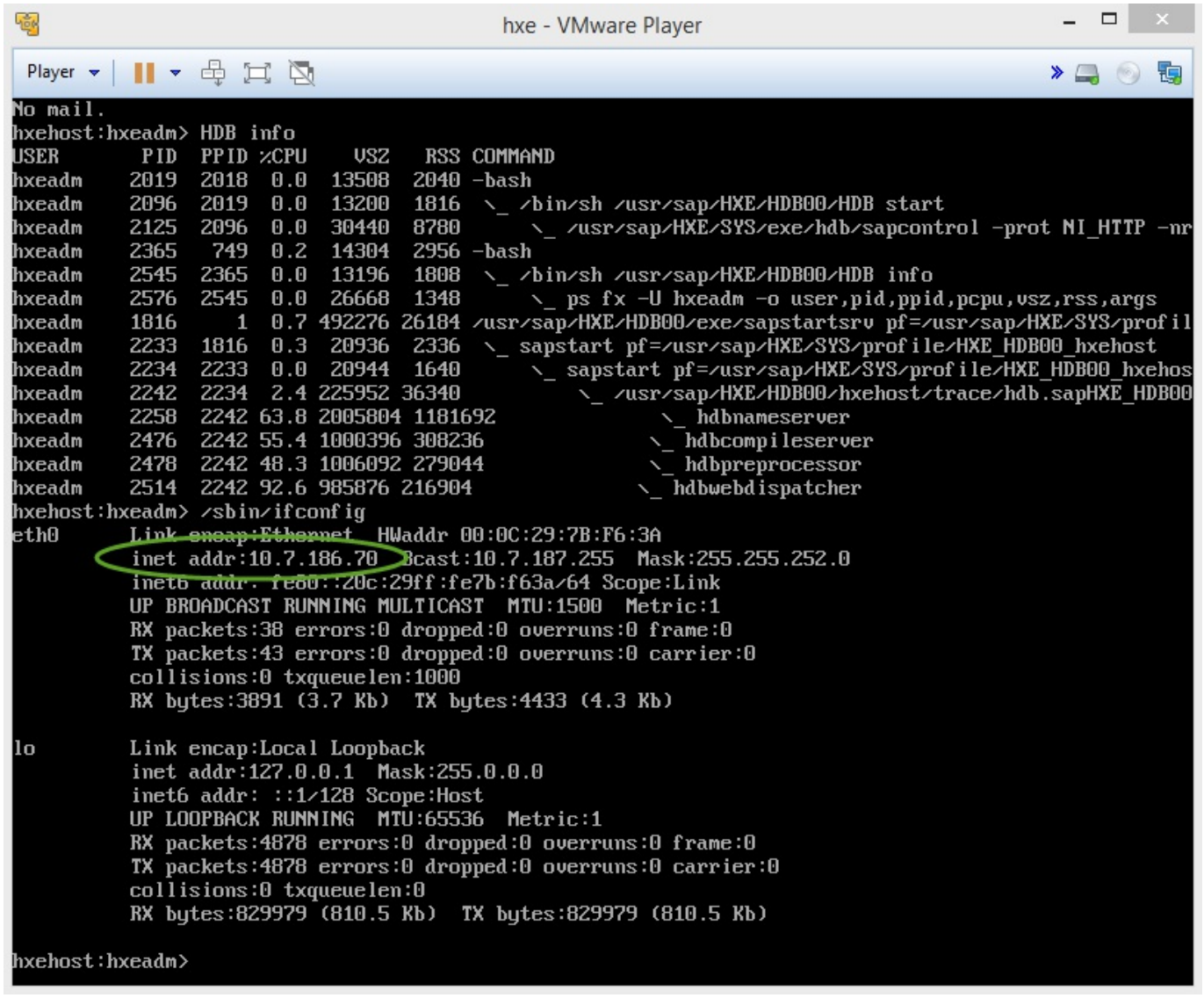
Changing the default SYSTEM user password can help secure your system.

1. From the command prompt, enter this command:
   `hdbsql -u SYSTEM -d SystemDB -p HXEHana1`
2. Follow the command prompts to update the password.

Record Your VM's IP Address

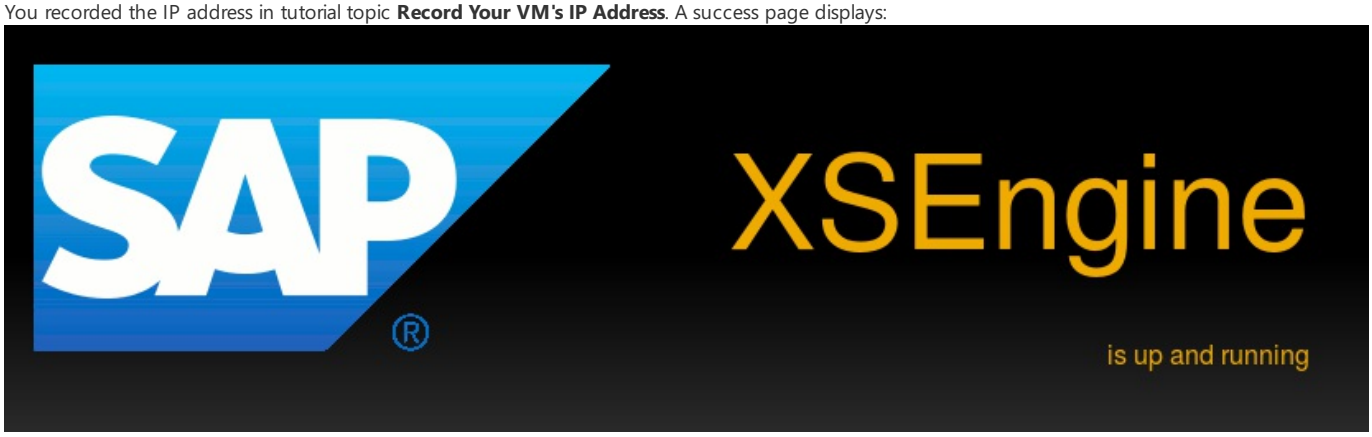
Record the IP address of your VM so you can reference it later to connect using SAP HANA client tools.

1. At the command prompt, enter:
   `/sbin/ifconfig`
2. Locate the IP address, listed under the `eth0` interface as `inet addr`.
   In the following example, the IP address is 10.7.186.70



Test XSC, XSA and Web IDE

If you installed the server plus applications (`hxexsa.ova`), test your XS installations and change the passwords of all XSA users.

1. Check that the `XSEngine` is running. From your VM desktop, open a browser and enter:
   `http://<ip address of VM>:8000`
   You recorded the IP address in tutorial topic **Record Your VM's IP Address**. A success page displays:
   

2. Change the passwords of all XSA users: a. Change the `XSA_ADMIN` user password. Enter:
   `hdbsql -u XSA_ADMIN -p HXEHana1 -d SystemDB`
   Follow the prompts to update the default password. b. Change the `XSA_DEV` user password. Enter:
   `hdbsql -u XSA_DEV -p HXEHana1 -d SystemDB`
   Follow the prompts to update the default password.
   c. Change the `XSA_SHINE` user password. Enter:
   `hdbsql -u XSA_SHINE -p HXEHana1 -d SystemDB`
   Follow the prompts to update the default password.
3. Log in to XSA services:

`xs login -u xsa_admin -p <password>`

4. Check for a series of entries beginning with `https://<ip address of VM>:30030`. If you see these entries, XSA installed correctly.
5. Enter:
   `xs target -s SAP`
6. View the list of XSA applications. Enter:
   `xs apps`
7. Check that the application `webide` shows in the list of XSA applications.
8. Test your Web IDE connection.
   On Windows, update the c:\Windows\System32\Drivers\etc\hosts file.
   On Linux and macOS, update /etc/hosts to add the IP address.
   Example:
   `<IP address of the VM>` `hxehost` # `<your IP address>`
9. Enter the URL for Web IDE in a browser on your laptop. The address is the one that displays in your
   `xs apps`
   command output.
   Example: `https://<hostname>:53075`

Configure SAP HANA Studio

Download SAP HANA Studio from the SAP HANA developer edition HANA Tools site to your laptop. Then connect to your SAP HANA, express edition instance.

1. Download Eclipse Neon from https://eclipse.org/downloads/
2. Review the installation procedure at https://tools.hana.ondemand.com/#hanatools. Ensure your laptop meets the prerequisites.
3. Follow the installation procedure, but select Eclipse Neon.
4. When directed to the Eclipse packages site, select either **Eclipse IDE for Java EE Developers** or **Eclipse IDE for Java Developers**.
5. Download to your laptop.
6. Start the Eclipse installer.
7. Select a workspace when prompted. The welcome page displays.
8. Select *Help* > *Install New Software*.
9. In the Work with field, type https://tools.hana.ondemand.com/neon and click **Add**. The Add Repository dialog box displays.
10. In the Name field, type **SAP HANA, express edition**.
11. Expand the **SAP HANA Tools** node.
12. Select **SAP HANA Administrator (Developer Edition)**.
13. Accept the installation wizard prompts. Eclipse restarts.
14. Select *Window* > *Perspective* > *Open Perspective* > *Other*.
15. Select the SAP HANA Administration Console perspective.
16. Right-click anywhere on the Systems tab and select **Add System**. The Specify System dialog box displays.
17. Enter:
    Host Name: (IP address you recorded in tutorial topic **Record Your VM's IP Address**)
    Instance Number: 00
18. Ensure you click **Multiple container mode** and click **System database**. This is important because the system is configured to run on multi-tenant mode with `SystemDB` as the default database out-of-the box.
19. Click **Next**. The Connection Properties dialog box displays.
20. Under *Authentication by database user*, enter:
    User Name: SYSTEM
    Password: (Password you specified when you changed the default SYSTEM password)
21. Click **Finish**. You are connected to HXE(SYSTEM).

Edit the /etc/hosts File

You may need to edit the /etc/hosts file on the VM.

1. Change
   `sudo echo <ipaddress> $(hostname -f) >> /etc/hosts`
   To
   `sudo sh -c 'echo <Type your IP Address> $(hostname -f) >> /etc/hosts'`

Turn on Statistics Server (`hxe.ova` Server-only Image)

If you downloaded `hxe.ova`, you can turn on statistics server from the command prompt.

1. Enter:
   `hdbsql -d SystemDB -u SYSTEM -p <system` **passwd**
   `> “alter system alter configuration( 'nameserver.ini','SYSTEM' ) SET ( 'statisticsserver','active' ) = 'true' with reconfigure”`

Configure Security

Apply the HANA, express-edition license key

If you don't apply the license, your SAP HANA, express edition will stop working after the default grace period of 60-90 days. If you have SAP HANA Studio or the HANA Studio eclipse plugin then begin at **Using Studio**. Otherwise proceed to **Using HDBSQL**.

Applying the License Key with HANA Studio

Obtain your hardware key

If you are using the SAP HANA Studio eclipse plugin, you can do the following.

1. Start SAP HANA studio.
2. On the Systems tab, select SYSTEMDB@HXE (SYSTEM).
3. View properties for SYSTEMDB@HXE (SYSTEM).
4. Select License properties. Open the System License tab.
5. Make a note of the Hardware Key value.

Order your license key

1. Go to http://sap.com/minisap page and fill out all required information.
2. For System ID, select HXE.
3. For Hardware Key, enter the hardware key value you recorded earlier.
4. Submit the form. The license key is emailed to you.
5. Save the license key file to your hard disk under the name `HXE.txt`.

Apply the license key

1. In SAP HANA studio, view properties for SYSTEMDB@HXE (SYSTEM).
2. Select License properties. Open the System License tab.
3. Click Delete License Key to delete any existing licenses.
4. Click Install License Key.
5. Navigate to your license file and select it.
   After confirmation, the properties page refreshes with your new license information.
6. Proceed to **Change the SSFS Master Keys**

Applying the License Key with HDBSQL

Obtain your hardware key

1. Login in to your HANA, express edition as `hxeadm`.
2. Enter the following command:

   ```
   hdbsql -u system -p <your password> -d SystemDB "SELECT HARDWARE_KEY FROM M_LICENSE"
   ```

3. Copy or otherwise record the value returned for `HARDWARE_KEY`.

Order your license key

1. Go to http://sap.com/minisap page and fill out all required information.
2. For System ID, select HXE.
3. For Hardware Key, enter the hardware key value you recorded earlier.
4. Submit the form. The license key is emailed to you.
5. Save the license key file to your hard disk under the name `HXE.txt`.

Apply the license key

1. Make a directory on your HXE machine to store the license.

   ```
   mkdir ~/license
   ```

   This command will make the directory `/usr/sap/HXE/home/license`

2. If you do not have an SCP client, please download and install one. There are several very good open source `scp` clients available for Windows, Mac and Linux. Copy the file from your hard disk to the `/usr/sap/HXE/home/license` directory.

3. Issue the following command to install the license key.

   ```
   hdbsql -u system -p <password> -n localhost:30013 -m -i <instance number> <<EOF
   SET SYSTEM LICENSE 'cat /usr/sap/HXE/home/license/HXE.txt'';
   EOF
   ```

Note: Make sure the license file string is surrounded by single quotation marks. After the license file string closing single quotation mark, make sure you include the back-tick and semicolon. For `<password>` and `<instance number>` etc., input values matching your SAP HANA, express edition settings.

4. Confirm that the license key was installed by issuing the following command.

```
hdbsql -u system -p <password> -d SystemDB "select hardware_key, expiration_date from m_licenses"
```

The expiration date should be one year from today.

5. Proceed to **Change the SSFS Master Keys**.

Change the SSFS Master Keys

The secure stores in the file system (SSFS) used by SAP HANA are protected by unique master keys, generated during installation or update. If you installed HXE from an OVA, then it shares master keys with other HXE systems. We recommend that you change the master keys immediately after setup to ensure that your master keys are not known outside your organization. For more information on changing the master keys, see the *Change the SSFS Master Keys* topic in the *SAP HANA Administration Guide*.

1. Log on to the HANA system as `hxeadm` and shut the system down using the `sapcontrol` program:

```
/usr/sap/hostctrl/exe/sapcontrol -nr 00 -function Stop
```

2. Re-encrypt the master key of the instance SSFS:

```
export RSEC_SSFS_DATAPATH=/usr/sap/HXE/SYS/global/hdb/security/ssfs
```

```
export RSEC_SSFS_KEYPATH=/usr/sap/HXE/SYS/global/hdb/security/ssfs
```

```
rsecssfx changekey $(rsecssfx generatekey -getPlainValueToConsole)
```

3. Add the following entry to the `global.ini` file using a text editor. (HANA, express edition, comes with the `vi` and `vim` text editors.) The `global.ini` file is located here: `/usr/sap/HXE/SYS/global/hdb/custom/config/global.ini`

   Add or edit the cryptography section with the following value.

```
[cryptography]
```

```
ssfs_key_file_path = /usr/sap/HXE/SYS/global/hdb/security/ssfs
```

4. Re-encrypt the system PKI SSFS with a new key - HDB start:

```
export RSEC_SSFS_DATAPATH=/usr/sap/HXE/SYS/global/hdb/security/ssfs
```

```
export RSEC_SSFS_KEYPATH=/usr/sap/HXE/SYS/global/hdb/security/ssfs
```

```
rsecssfx changekey $(rsecssfx generatekey -getPlainValueToConsole)
```

5. Restart the system:

```
/usr/sap/hostctrl/exe/sapcontrol -nr 00 -function Start
```

Change the Root Key

SAP HANA generates unique root keys on installation. If you installed HXE from an OVA, then it shares a root key with other HXE systems. We recommend that you change the root key of the internal data encryption service to ensure it is not known outside your organization. For more information on this topic, see the *Change the Root Key of the Internal Data Encryption Service* topic in the *SAP HANA Server Installation and Update Guide*.

1. Log on to the HANA system as `hxeadm` and shut the system down using the `sapcontrol` program:

```
/usr/sap/hostctrl/exe/sapcontrol -nr 00 -function Stop
```

2. Generate a new root encryption key using the `hdbnsutil` program:

```
cd /usr/sap/HXE/HDB00/exe
```

```
./hdbnsutil -generateRootKeys --type=DPAPI
```

3. Restart the system:

```
/usr/sap/hostctrl/exe/sapcontrol -nr 00 -function Start
```

4. Reset the consistency information in the SSFS using the `hdbcons` program:

```
cd /usr/sap/HXE/HDB00/exe
```

```
./hdbcons "crypto ssfs resetConsistency" -e hdbnameserver
```

5. After running the `hdbcons` command you have 20 seconds to rerun the command again to completely rewrite `ssfs` consistency information:

```
./hdbcons "crypto ssfs resetConsistency" -e hdbnameserver
```

6. Change all application keys so that they are encrypted with the new root key by using SAP HANA studio or SAP HANA HDBSQL:

```
hdbsql -u system -p <YourPassword> -d SystemDB "ALTER SYSTEM APPLICATION ENCRYPTION CREATE NEW KEY"
```

Troubleshooting

Download Manager Internal Error: "downloaded size does not match content length"

Issue

You are downloading packages using Download Manager. The download fails. The Download Manager log file displays this error message: *Internal error: downloaded size does not match content length* The Download Manager log file is located at `/tmp/hxedm_[yymmdd].log` on Linux and `%TEMP%\hxedm_[yymmdd].log` on Windows.

Solution

Either the file on the download server changed since your last download session, or partial download files from your previous download session are corrupted. Delete `*.001` to `*.008` files in your download directory and run the Download Manager again.

Download Manager Error Message: "Failed to verify {0} checksum"

Issue

You are downloading packages using Download Manager. The download fails and this error displays: *Failed to verify {0} checksum*

Solution

Either the file on the download server changed since your last download session, or the download file is inaccessible/corrupted. Delete the download file and/or .00* in the download directory and run the Download Manager again.

Download Manager Error Message: "Failed to join downloaded files"

Issue

You are downloading packages using Download Manager. The download fails and this error displays: *Failed to join download files*

Solution

Download manager failed to assemble the download file. This might be because of lack of disk space in the download directory. In Linux, run: **cat .001 .002 .003 .004 .005 .006 .007 .008 > < `final_filename` >**

In Windows, run: **type .001 .002 .003 .004 .005 .006 .007 .008 > < `final_filename` >**

Virtual Machine: Checking Resource Usage

Issue

You are having memory issues on your VM and want to check resource usage.

Solution

If you have HANA studio, right-click on the system and select **Configuration and Monitoring > Open Administration** and check the Overview and Landscape tabs for anything in red.

If you don't have HANA Studio, run the following queries in `hdbsql` to view SAP HANA resource usage:

```
select service_name, round(effective_allocation_limit/1024/1024/1024, 1) as MemLimit, round(total_memory_used_size/1024/1024/1024,1) as
MemUsed from m_service_memory;
```

If the `MemUsed` is close to the `MemLimit`, you may encounter problems allocating memory.

Alternatively, you can run the Linux `free` command at the command line to see free resources:

```
free -g
```

The key number is in the second row (-/+ buffers/cache) in the **free** column. If this number is low, (e.g. 1 GB) you may have run out of memory when performing your recent operation.

You can also run the following command to see if you are running out of disk space on the VM's `filesystem`:

```
df -h
```

Look for the **Use%** for the `/dev/sda1 filesystem`. If it is down to just a few GB, you may have run out of disk space when performing your recent operation.

Updating the Installation

Download and Extract the Installation Files

1. Using the download manager, select **Binary Installer** and download the **Server only** package. If you are updating a **Server + applications** virtual machine, download the **Applications** package as well.
2. Using an FTP client, copy the packages from your local machine to the virtual machine.
3. Extract the contents of the packages.

Update the Server Installation

1. Navigate to the following directory:

   ```
   cd <download_path>/HANA_10_DEE/DATA_UNITS/HDB_SERVER_LINUX_X86_64
   ```

2. As the root user, run one of the following commands to begin the SAP HANA server update:

   ```
   sudo ./hdbupd --ignore=check_min_mem,check_plugin_dependencies
   ```

3. Follow the prompts to complete the server update.

Update the Applications Package

1. Navigate to the following directory:

   ```
   cd <download_path>/HANA_10_DEE/DATA_UNITS/HDB_SERVER_LINUX_X86_64
   ```

2. As the root user, run the following command to update XSA applications:

   ```
   sudo ./hdblcm --action=update --components=xs --xs_components=all --configfile=configurations/auto_install.cfg --component_medium=
   <download_path>/HANA_10_DEE
   ```

3. Follow the prompts to complete the XSA update.
4. As the `hxeadm` user, log in to XSA services:

   ```
   xs login -u XSA_ADMIN -p <password>
   ```

5. Stop the jobscheduler services:

   ```
   xs stop jobscheduler-rest
   xs stop jobscheduler-service
   xs stop jobscheduler-backend
   xs stop jobscheduler-broker
   ```

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