



The science behind the report:

# Help more customers and get them from landing page to checkout faster with a Dell EMC, Red Hat, and Microsoft solution

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report [Support more customers and get them from landing page to checkout faster by upgrading to a Dell EMC PowerEdge R740xd running Microsoft SQL Server 2017 Standard on Red Hat Enterprise Linux 7.5.](#)

On April 17, 2018, we finalized the hardware and software configurations we tested. Updates for current and recently released hardware and software appear often, so unavoidably these configurations may not represent the latest versions available when this report appears. For older systems, we chose configurations representative of typical purchases of those systems. We concluded hands-on testing on May 02, 2018.

## Our results

The table below presents our findings in detail.

|                                     | OPM     | Application latency (ms) | Drive read latency (ms) | Drive write latency (ms) |
|-------------------------------------|---------|--------------------------|-------------------------|--------------------------|
| Dell EMC™ PowerEdge™ R740xd         | 177,493 | 7                        | 0.19                    | 0.26                     |
| Dell EMC PowerEdge R720xd           | 29,135  | 48                       | 24                      | 31                       |
| Percentage improvement with upgrade | 509%    | 85%                      | 99%                     | 99%                      |

## System configuration information

We ran the DVD Store 2 test from a client server on a Dell EMC PowerEdge R720xd with 24 15K SAS HDDs. We first began by splitting up the disks into three RAID10 volumes. We used 2 disks for our OS volume, 16 disks for our Data volume, and 6 disks for our Log volume. We started testing with the R720xd, tuning the warm-up time, thread count, and think time until the benchmark ran at peak orders per minute (OPM).

We then ran the same test using the same method on the PowerEdge R740xd server configured with two 300GB 12Gbps 15K SAS HDDs and twelve 960GB 6Gbps SATA SSDs. We used the two HDDs in a RAID1 configuration for our OS volume, 10 SSDs in RAID10 for our Data volume, and the remaining two SSDs in RAID1 for our Log volume.

The table below presents detailed information on the systems we tested.

| Server configuration information               | Dell EMC PowerEdge R740xd  | Dell EMC PowerEdge R720xd                                 |
|--|--|---|
| BIOS name and version                          | Dell 1.3.7   | Dell 2.6.1  |
| Non-default BIOS settings                      | None   | Virtualization enabled                                    |
| Operating system name and version/build number | Red Hat® Enterprise Linux® 7.5, kernel version 3.10.0-862.el7.x86_64 | Windows Server® 2012 R2 Standard, Version 6.3, Build 9600 |
| Date of last OS updates/patches applied        | 04/17/2018   | 03/21/18  |
| Power management policy                        | Performance  | Performance   |
| Processor                                      |  |   |
| Number of processors                           | 2  | 2   |
| Vendor and model                               | Intel® Xeon® Gold 6130   | Intel Xeon E5-2640  |
| Core count (per processor)                     | 16   | 6   |
| Core frequency (GHz)                           | 2.10   | 2.50  |
| Stepping                                       | H0   | C2  |
| Memory module(s)                               |  |   |
| Total memory in system (GB)                    | 192  | 192   |
| Number of memory modules                       | 12   | 12  |
| Vendor and model                               | Hynix HMA82GR7AFR8N-VK   | Hynix HMT42GR7MFR4C-PB                                    |
| Size (GB)                                      | 16   | 16  |
| Type   | DDR4-2666  | PC3-12800R  |
| Speed (MHz)                                    | 2,666  | 1,333   |
| Speed running in the server (MHz)              | 2,666  | 1,333   |
| Storage controller                             |  |   |
| Vendor and model                               | Dell PERC H730P Mini   | Dell PERC H710P Mini                                      |
| Cache size (GB)                                | 1GB  | 1GB   |
| Firmware version                               | 25.5.4.0006  | 21.3.5-0002   |
| Driver version                                 | 6.604.06.00  | 6.805.03.00   |

| Server configuration information           | Dell EMC PowerEdge R740xd | Dell EMC PowerEdge R720xd    |
|--|---------------------------|------------------------------|
| Local storage (type A)                     |                           |                              |
| Number of drives                           | 2                         | 24                           |
| Drive vendor and model                     | Dell ST300MP0026          | Dell ST9300653SS             |
| Drive size (GB)                            | 300                       | 300                          |
| Drive information (speed, interface, type) | 15K, 12Gbps, SAS, HDD     | 15K, 6Gbps, SAS, HDD         |
| Local storage (type B)                     |                           |                              |
| Number of drives                           | 12                        | N/A                          |
| Drive vendor and model                     | Dell THNSF8960CCSE        | N/A                          |
| Drive size (GB)                            | 960                       | N/A                          |
| Drive information (speed, interface, type) | 6Gbps, SATA, SSD          | N/A                          |
| Network adapter                            |                           |                              |
| Vendor and model                           | QLogic BCM57800 10 GbE    | Intel Gigabit 4P I350-t rNDC |
| Number and type of ports                   | 2 x 1GbE, 2 x 10GbE       | 4 x 1GbE                     |
| Driver version                             | 7.13.104.0                | 12.14.7.0                    |
| Cooling fans                               |                           |                              |
| Vendor and model                           | Nidec UltraFlo 4VXP3-X30  | San Ace 60 9GA0612P1J611     |
| Number of cooling fans                     | 6                         | 6                            |
| Power supplies                             |                           |                              |
| Vendor and model                           | Dell D1600E-S0            | Dell E1100E-S0               |
| Number of power supplies                   | 2                         | 2                            |
| Wattage of each (W)                        | 1,600                     | 1,100                        |

## How we tested

We ran the DVD Store 2 test from a client server on a Dell EMC PowerEdge R720xd with 24 15K SAS HDDs. We first began by splitting up the disks into three RAID10 volumes. We used 2 disks for our OS volume, 16 disks for our Data volume, and 6 disks for our Log volume. We started testing with the R720xd, tuning the warm-up time, thread count, and think time until the benchmark ran at peak orders per minute (OPM).

We then ran the same test using the same method on the PowerEdge R740xd server configured with two 300GB 12Gbps 15K SAS HDDs and twelve 960GB 6Gbps SATA SSDs. We used the two HDDs in a RAID1 configuration for our OS volume, 10 SSDs in RAID10 for our Data volume, and the remaining two SSDs in RAID1 for our Log volume.

## Installing Microsoft® Windows Server 2012 R2 on the Dell EMC PowerEdge R720xd server

1. Insert the installation media into the CD/DVD drive, and restart the server.
2. When the option appears, press F11 to enter the Boot Manager.
3. Select BIOS Boot Menu.
4. Select SATA Optical Drive, and press Enter.
5. When prompted to boot from DVD, press any key.
6. When the installation screen appears, click My language is English (United States).
7. Leave the language, time/currency format, and input method as default, and click Next.
8. Click Install now.
9. When the installation prompts you, enter the product key.
10. Select Windows Server 2012 Standard (Server with a GUI), and click Next.
11. Check I accept the license terms, and click Next.
12. Click Custom: Install Windows only (advanced).
13. Select Drive 0 Unallocated Space, and click Next. Windows will begin and restart automatically.
14. At the Settings page, fill in the Password and Reenter Password fields with the same password.
15. Log in with the password you set up in the previous step.

## Configuring Windows Update on the Dell EMC PowerEdge R720xd server

1. In the left pane of the Server Manager window, click Local Server.
2. In the main frame, next to Windows Update, click Not configured.
3. In the Windows Update window, in the main pane, click Let me choose my settings.
4. Under Important updates, select Never check for updates (not recommended), and click OK.
5. In the left pane, click Check for updates, and install all available updates.
6. Close the Windows Update window.

## Disabling the Windows Update Service on the Dell EMC PowerEdge R720xd server

1. After you have installed all updates, press the Start Menu button and type Services.
2. Scroll down and right-click on the Windows Update service.
3. Click Properties.
4. Choose Disabled as the startup type.
5. Stop the service if it is running.
6. Click Apply.
7. To close the window, click OK.

## Formatting a Windows NTFS volume for SQL Server on the Dell EMC PowerEdge R720xd server

1. Right-click the start icon, and click Disk Management.
2. Right-click the disk, and click Online.
3. Right-click the disk again, and click Initialize.
4. Right-click an unallocated area, and select New Simple Volume.
5. Click Next.

6. Click Next.
7. Assign a letter path, and click Next.
8. Set the Allocation Unit Size to 64K, and name the Volume Label.
9. Click Next.
10. Click Finish.
11. Repeat steps 1 through 10 on all data and log volumes.

## Installing SQL Server 2008 R2 on the PowerEdge R720xd

1. Mount the installation DVD for SQL Server 2008 R2.
2. Click Run SETUP.EXE. If Autoplay does not begin the installation, navigate to the SQL Server 2008 DVD, and double-click it.
3. In the left pane, click Installation.
4. Click New SQL Server stand-alone installation or add features to an existing installation.
5. Select the Enter the product key radio button, and enter the product key. Click Next.
6. To accept the license terms, click the check-box, and click Next.
7. To check for updates, click Use Microsoft Update, and click Next.
8. To install the setup support files, click Install.
9. If no failures appear, click Next.
10. At the Setup Role screen, choose SQL Server Feature Installation, and click Next.
11. At the Feature Selection screen, select Database Engine Services, Full-Text and Semantic Extractions for Search, Client Tools Connectivity, Client Tools Backwards Compatibility, Management Tools—Basic, and Management Tools—Complete. Click Next.
12. At the Installation Rules screen, after the check completes, click Next.
13. At the Instance configuration screen, leave the default selection of default instance, and click Next.
14. At the Server Configuration screen, choose NT Service\SQLSERVERAGENT for SQL Server Agent, and choose NT Service\MSSQLSERVER for SQL Server Database Engine. Change the Startup Type to Automatic. Click Next.
15. At the Database Engine Configuration screen, select the authentication method you prefer. In our tests, we selected Mixed Mode.
16. Enter and confirm a password for the system administrator account.
17. Click Add Current user. This may take several seconds.
18. Click Next.
19. At the Error and usage reporting screen, click Next.
20. At the Installation Configuration Rules screen, check to ensure there are no failures or relevant warnings, and click Next.
21. At the Ready to Install screen, click Install.
22. After installation completes, click Close.
23. Close the installation window.

## Installing and configuring Red Hat Enterprise Linux 7.5

1. Boot from the Red Hat Enterprise Linux 7.5 installation DVD.
2. Modify the default disk partitioning to only use the volume allocated to the operating system and to create the following partitions: 50GiB for /root, 200GiB for /var, 23.67 GiB for /opt, 200 MiB for /boot, 4096 MiB for swap.
3. Choose Minimal Install.
4. Disable kdump.
5. Enable the first active network port and configure it. For example, assign static IP address of 10.220.64.11/16 with gateway of 10.220.0.1, and DNS server of 10.41.0.10.
6. Set the hostname to linux-db-01.
7. Set the time zone to Eastern/US; enable NTP to sync only from 10.40.0.1
8. Click Install.
9. Set the root password.
10. When the installation completes, reboot the server.
11. Log on as root.
12. Connect to the Red Hat repository and update the operating system software:

```
subscription-manager register
subscription-manager attach --auto
yum -y update
Stop and disable a few unneeded services.
for i in postfix.service firewalld.service ; do
    systemctl disable $i
    systemctl stop $i
done
```

13. Stop and disable a few unneeded services:

```
sed -i 's/^SELINUX=enforcing/SELINUX=disabled/' /etc/selinux/config
```

14. Set the tuning profile to throughput-performance:

```
tuned-adm profile throughput-performance
```

15. Modify kernel parameters as suggested by the guide, [Performance best practices and configuration guidelines for SQL Server 2017 on Linux](#), for the standard edition of SQL Server on Linux 2017:

```
cat >> /etc/sysctl.d/99-sysctl.conf <<EOF
kernel.numa_balancing=0
vm.max_map_count=262144
EOF
```

16. Prepare SQL Server data and log volumes:

```
for disk in /dev/sd{b,c} ; do
    echo $disk
    parted $disk mklabel gpt
    parted $disk mkpart mkpart primary "1 -1"
    mkfs.xfs ${disk}
done
mkdir -p /opt/db/{data,logs}
cat >> /etc/fstab <<EOF
#
# MSSQL data and log areas
/dev/sdb1 /opt/db/data xfs defaults 0 0
/dev/sdc1 /opt/db/logs xfs defaults 0 0
EOF

mount -a
chown mssql:mssql /opt/db/{data,logs}
```

17. Reboot the server:

```
shutdown -r now
```

## Installing Microsoft SQL Server 2017 on Red Hat Enterprise Linux 7.5

We closely followed the installation instructions in the guide, [Quickstart: Install SQL Server and create a database on Red Hat](#).

1. Log in as root.

2. Obtain and add the Microsoft's RHEL7 software repositories for SQL Server 2017 on Linux:

```
curl -o /etc/yum.repos.d/mssql-server.repo \
    https://packages.microsoft.com/config/rhel/7/mssql-server-2017.repo
curl -o /etc/yum.repos.d/msprod.repo \
    https://packages.microsoft.com/config/rhel/7/prod.repo
```

3. Install SQL Server (including tools and the full-text searches for SQL Server) and Linux dependencies. Note that the installation requires user interaction to accept EULAs.

```
yum remove -y unixODBC-utf16 unixODBC-utf16-devel dos2unix
yum install -y mssql-server mssql-tools mssql-server-fts unixODBC-devel
```

4. Perform initial set up of Microsoft SQL Server by running the following command. Choose 'Standard' edition; accept the license; and set the password for account 'SA' to 'Passw0rd@'.

```
export PATH=/opt/mssql/bin:/opt/mssql-tools/bin:$PATH
mssql-conf setup
```

5. Perform additional configuration of SQL Server, including setting the location of its default data and log directories, and setting its memory limit to approximately 95% of the available memory.

```
mssql-conf set filelocation.defaultdatadir /opt/db/data/
mssql-conf set filelocation.defaultlogdir /opt/db/logs/
mssql-conf set memory.memorylimitmb 183880
mssql-conf set telemetry.customerfeedback false
```

6. Restart SQL Server.

```
systemctl restart mssql-server
```

7. We used Microsoft SQL Server Management Studio v17.6 to perform these final configuration steps, though you can perform them with the Linux SQL command-line program.
  - a. Set the process affinity for the Processors and I/O by right clicking on the Server Instance and selecting Properties → Processors.
  - b. Set the Processor Affinity to use all 32 hyperthreads on NUMA node 0 (CPUS 0-31) and the first 16 hyperthreads on NUMA node 1 (CPUS 32-47). This is the maximum number of CPUS permitted under a Standard Edition license.
  - c. Select Automatically set I/O affinity mask for all processors.
  - d. Click OK.
8. Resize the existing datafile and create seven additional data files for the instance's tempdb so that there are eight 8GB data files total.
  - a. Expose the tempdb database under Databases → System Databases.
  - b. Right-click tempdb → properties → Files.
  - c. Resize the sole data file to 8,192MB with 0 autogrowth and ensure it is located in directory /opt/db/data.
  - d. Create seven additional data files, tempdb2.ndf, ..., tempdb8.ndf, of size 8,192MB with 0 autogrowth in directory /opt/db/data.
  - e. Click OK.

## Installing and configuring the database clients

For the DS2 scripts, we used a single client to simulate a user putting a load on the server. For our client, we copied the DS2 driver files from <https://github.com/dvdstore/ds21>. We installed the .NET 3.5 framework on each client, as the DS2 test executable requires at least .NET2.0. We followed this process for the installation:

1. On the client server, install Microsoft Windows Server 2016.
2. Enter a password for the administrator log on.
3. Select Eastern Time Zone.
4. Use typical settings for the Network installation.
5. For the workgroup, type `Workgroup`
6. Install Windows Updates, .NET 3.5 framework, and copy the DVD Store client executable into the C:\ClientShare folder.
7. Note: We customized the DS2 driver adding options to specify the SQL database name, log performance output to a CSV file, and adjust OPM report rate frequency. Additionally, we added the output of orders per second (OPS) for more detailed reporting during tuning.
8. Assign a valid IP address and subnet mask to the client's NIC.

## Setting up DVD Store

### Data generation overview

We built the database schema using the scripts in the DS2 distribution package. First, we extracted the DS2 folder on a Linux server. Prior to running the data generation script, we recompiled each generation script to upgrade them to 64-bit to avoid integer limits for larger datasets. These files can be found at ds2/data\_files in three different folders: orders, cust, prod.

Run the following from the orders folder:

```
gcc -o ds2_create_orders ds2_create_orders.c -lm
gcc -o ds2_create_inv ds2_create_inv.c -lm
```

Run the following from the cust folder:

```
gcc -o ds2_create_cust ds2_create_cust.c -lm
```

Run the following from the prod folder:

```
gcc -o ds2_create_prod ds2_create_prod.c -lm
```

Then we used the Install\_DVDstore.pl script generate 400GB of data and the SQL database creation scripts. We then copied the data files and scripts to the R720xd and the R740xd servers. We ran the database creation scripts on each server to create the 400GB database for SQL Server 2008 R2 and SQL Server 2017, making changes to file locations, expanding to four files per file group, and increasing the initial datafile sizes. For the SQL Server 2017, we ran the DS2 database in SQL 2014 compatibility mode due to some issues with DS2 and newer SQL database versions. We then created a full backup of each database for restoring in between test runs. The 400GB database backup we used for SQL 2017 was built on a Windows-based SQL 2017 instance.

Note that the DVD store data can be generated on and loaded from either a Linux or Windows server to the SQL Server 2017 on Linux instance. The latter is more straightforward because the DVD Store data generation and load scripts assume that Windows line termination and file-path conventions are used when the target is SQL Server. The scripts are readily modified to correct for this assumption, but we did not do that for this study.

To use the backup for our testing, we did the following:

1. Copy the backup file to a local directory on the Linux server; for example, /opt/db/data/400GB-SQL2017.bak.
2. Remove write permissions from and give all users permission to read the backup file.

```
chmod a-w,a+r /opt/db/data/400GB-SQL2017.bak
```

## Performing the test

Using the legacy server as our base system, we ran the DS2 test while monitoring the time to fully cache the memory, as well as disk utilization at differing think times and thread counts. We determined that a warm-up time of 45 minutes to fill the RAM for legacy (30-minute warm-up on the R740xd solution) and a runtime of 30 minutes with 0 think time and 24 threads provided peak OPM performance on the legacy system, and kept these parameters consistent across all systems and tests. On the PowerEdge R720xd server under test, we created a user-defined data collector set in Perfmon to capture CPU, RAM, and disk performance counters.

For the PowerEdge R720xd testing on Windows, we did the following:

1. Start the custom Perfmon data collector set on the target host to capture CPU, RAM, and disk counters.
2. Run DS2 driver command on client:  

```
ds2sqlserverdriver.exe -target=SQLServer_IP --ramp_rate=10 --run_time=30 ^  
  --n_threads=24 --db_size=400GB --think_time=0 --detailed_view=Y ^  
  --warmup_time=30 --report_rate=1 --csv_output=C:\ds2_output\filename.csv
```
3. When the run finishes, stop Perfmon.
4. Save the DS2 results text file and Perfmon output.
5. Restore the database backup using the scripts in the next section.
6. Reboot the server.
7. Repeat steps 2 through 6 two times to account for variance.

For the PowerEdge R740xd Linux testing, we did the following:

1. Before each run, restore DVD Store data from the backup file.  

```
sqlcmd -S localhost -U SA -P Passw0rd@ -I ~/restore.sql
```
2. Clear the filesystem data cache.
3. echo 3 > /proc/sys/vm/drop\_caches Start the system performance gathering scripts.  

```
bash sar_iostat.sh 750
```

```
cat sar_iostat.sh  
#!/bin/bash  
if [[ -z "$1" ]]; then  
  echo "usage: $0 #_of_5s_steps"  
fi  
m=${HOSTNAME}_$(date "+%Y%m%d%H%M%S")  
sar -o sar-out_${m}.sa 5 $1 >/dev/null 2>&1 &  
S_TIME_FORMAT=ISO \  
  iostat -dxmtY -p sdaa sda sdb sdc 5 $1 > iostat-out_${m}.txt 2>&1 &
```
4. Run the DS2 driver command on client:  

```
ds2sqlserverdriver.exe -target=SQLServer_IP --ramp_rate=10 --run_time=30 ^  
  --n_threads=24 --db_size=400GB --think_time=0 --detailed_view=Y ^  
  --warmup_time=30 --report_rate=1 --csv_output=C:\ds2_output\filename.csv
```
5. Save the DS2 results text file and system performance output files.
6. Reboot the server.
7. Repeat steps 2 through 6 two times to account for variance.

## Database restore scripts for DVD Store 2

We used the following SQL script to restore the PowerEdge R720xd DS2 database backup in between test runs.

```
USE [master]
GO
IF EXISTS (SELECT * FROM sys.server_principals WHERE name = N'ds2user')
DROP LOGIN [ds2user]
GO
CREATE LOGIN [ds2user] WITH PASSWORD=N'', DEFAULT_DATABASE=[master], DEFAULT_LANGUAGE=[us_english],
CHECK_EXPIRATION=OFF, CHECK_POLICY=OFF
GO
USE [master]
GO
IF EXISTS (SELECT name FROM sys.databases WHERE name = N'DS2')
DROP DATABASE [DS2]
GO
RESTORE DATABASE [DS2]
FROM DISK = N'E:\Backup\400GB-SQL2017.bak'
WITH FILE = 1,
MOVE N'primary' TO N'E:\Data\ds.mdf',
MOVE N'ds_misc' TO N'E:\Data\ds_misc.ndf',
MOVE N'cust1' TO N'E:\Data\cust1.ndf',
MOVE N'cust2' TO N'E:\Data\cust2.ndf',
MOVE N'cust3' TO N'E:\Data\cust3.ndf',
MOVE N'cust4' TO N'E:\Data\cust4.ndf',
MOVE N'orders1' TO N'E:\Data\orders1.ndf',
MOVE N'orders2' TO N'E:\Data\orders2.ndf',
MOVE N'orders3' TO N'E:\Data\orders3.ndf',
MOVE N'orders4' TO N'E:\Data\orders4.ndf',
MOVE N'ind1' TO N'E:\Data\ind1.ndf',
MOVE N'ind2' TO N'E:\Data\ind2.ndf',
MOVE N'ind3' TO N'E:\Data\ind3.ndf',
MOVE N'ind4' TO N'E:\Data\ind4.ndf',
MOVE N'ds_log' TO N'H:\Log\ds_log.ldf',
NOUNLOAD, STATS = 10
GO
USE [DS2]
GO
IF EXISTS (SELECT * FROM sys.database_principals WHERE name = N'ds2user')
DROP USER [ds2user]
GO
USE [DS2]
GO
CREATE USER [ds2user] FOR LOGIN [ds2user]
GO
USE [DS2]
GO
EXEC sp_addrolemember N'db_owner', N'ds2user'
GO
```

Below is the restore script we used for the PowerEdge R740xd solution:

```
USE [master]
GO
IF EXISTS (SELECT * FROM sys.server_principals WHERE name = N'ds2user')
DROP LOGIN [ds2user]
GO
CREATE LOGIN [ds2user] WITH PASSWORD=N'', DEFAULT_DATABASE=[master], DEFAULT_LANGUAGE=[us_english],
CHECK_EXPIRATION=OFF, CHECK_POLICY=OFF
GO
USE [master]
GO
```

```

IF EXISTS (SELECT name FROM sys.databases WHERE name = N'DS2')
  DROP DATABASE [DS2]
GO
RESTORE DATABASE DS2 FROM DISK = N'/opt/db/data/400GB-SQL2017.bak'
WITH REPLACE, FILE = 1,
  MOVE N'primary' TO N'/opt/db/data/ds.mdf',
  MOVE N'ds_misc' TO N'/opt/db/data/ds_misc.ndf',
  MOVE N'cust1' TO N'/opt/db/data/cust1.ndf',
  MOVE N'cust2' TO N'/opt/db/data/cust2.ndf',
  MOVE N'cust3' TO N'/opt/db/data/cust3.ndf',
  MOVE N'cust4' TO N'/opt/db/data/cust4.ndf',
  MOVE N'orders1' TO N'/opt/db/data/orders1.ndf',
  MOVE N'orders2' TO N'/opt/db/data/orders2.ndf',
  MOVE N'orders3' TO N'/opt/db/data/orders3.ndf',
  MOVE N'orders4' TO N'/opt/db/data/orders4.ndf',
  MOVE N'ind1' TO N'/opt/db/data/ind1.ndf',
  MOVE N'ind2' TO N'/opt/db/data/ind2.ndf',
  MOVE N'ind3' TO N'/opt/db/data/ind3.ndf',
  MOVE N'ind4' TO N'/opt/db/data/ind4.ndf',
  MOVE N'ds_log' TO N'/opt/db/logs/ds_log.ldf';
GO
USE [DS2]
GO
IF EXISTS (SELECT * FROM sys.database_principals WHERE name = N'ds2user')
  DROP USER [ds2user]
GO
USE [DS2]
GO
CREATE USER [ds2user] FOR LOGIN [ds2user]
GO
USE [DS2]
GO
EXEC sp_addrolemember N'db_owner', N'ds2user'
GO
ALTER DATABASE [DS2] SET COMPATIBILITY_LEVEL = 120
GO

```

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