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GRAVIC® Shadowbase

Hewlett Packard Enterprise Technology Partner SILVER PARTNER

HPE Shadowbase Support for IBM Db2®

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IBM DB2

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Agenda

HPE Shadowbase Supported Platforms

Enhancements to HPE Shadowbase for IBM Db2® Support

HPE Shadowbase IBM Db2 Sample Architectures:

- From Db2 on AIX, Linux, or Windows to HPE NonStop
- From Db2 on z/OS to HPE NonStop
- From NonStop to Db2 on AIX, Linux, or Windows
- From NonStop to Db2 on IBM Mainframe

Current HPE Shadowbase Db2 Requirements

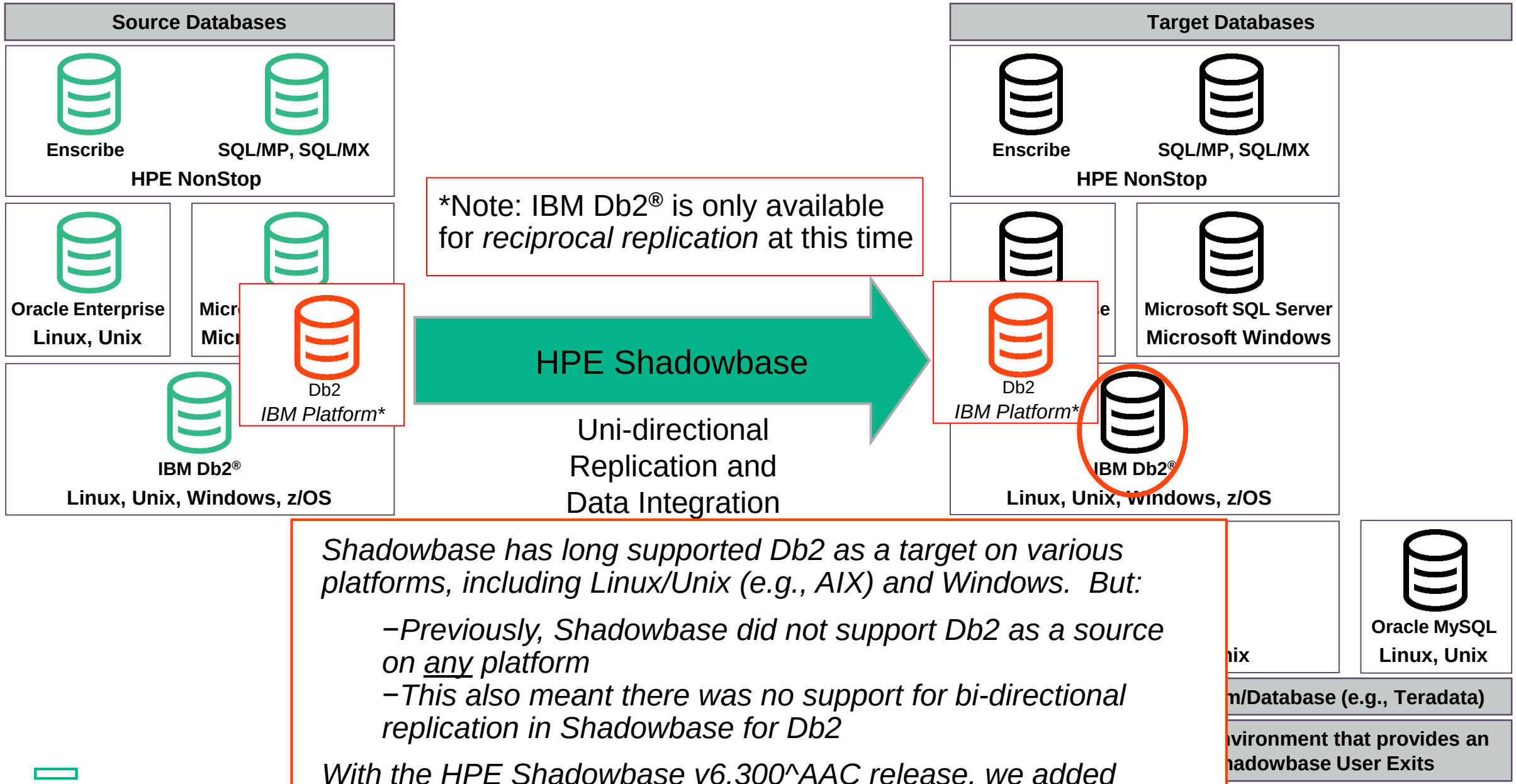
Possible Future HPE Shadowbase Db2 Enhancements

Further Information

Questions? Please ask as we go along…

HPE Shadowbase Supported Platforms

Homogeneous & Heterogeneous Uni-directional Data Replication



Shadowbase has long supported Db2 as a target on various platforms, including Linux/Unix (e.g., AIX) and Windows. But:

- *Previously, Shadowbase did not support Db2 as a source on <u>any</u> platform*
- *This also meant there was no support for bi-directional replication in Shadowbase for Db2*

With the HPE Shadowbase v6.300^AAC release, we added support for IBM Db2 as a source!

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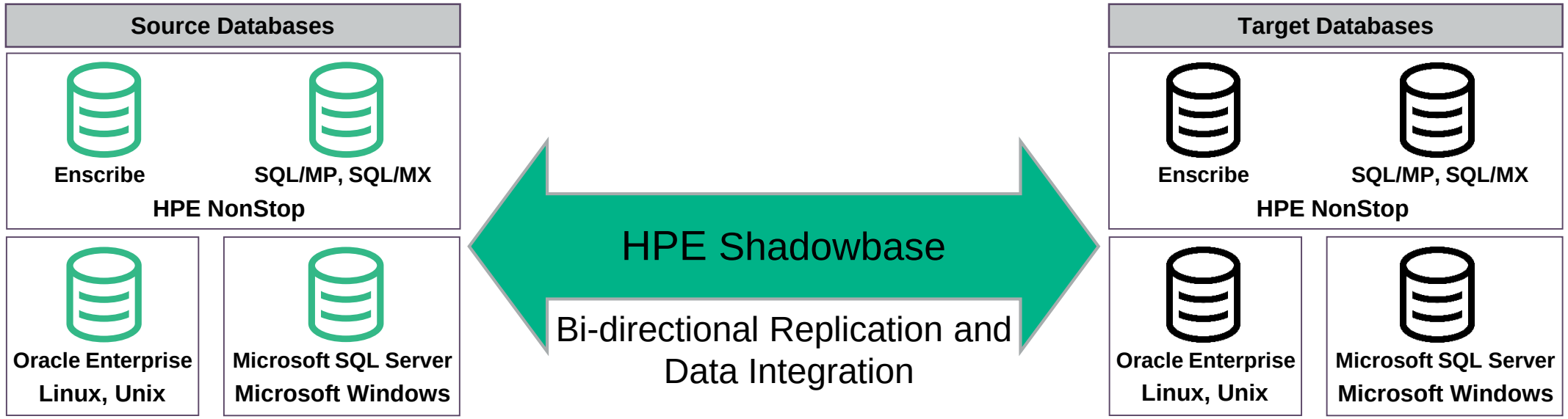
Homogeneous & Heterogeneous Bi-directional Data Replication



Enhancements to HPE Shadowbase for IBM Db2® Support

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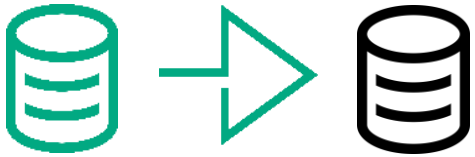
Enhancements to HPE Shadowbase for IBM Db2® Support

- Uni-directional Db2 source replication to any supported HPE Shadowbase target
- Db2 source database can be on any IBM source environment/platform
  - AIX, Linux, Windows, z/OS, etc.
- Does not require the installation of any HPE Shadowbase components on the source Db2 environment, nor any changes to the application
  - Uses *IBM InfoSphere Data Event Publisher* (IDEP) on the source environment to extract the transactional database changes from the Db2 change log and feed them into MQ Series for transport
  - Uses *IBM MQ Series* on the source environment (or data appliance, depending on the configuration) to deliver the source transactional database changes into HPE Shadowbase
  - Requires a Db2 client connection into the Db2 source database for HPE Shadowbase to extract Db2 table schema information (similar to any other application that accesses the Db2 database)
  - Works with any MQ version supported by IDEP
- So, with this new introduction, HPE Shadowbase now supports Db2 both as a source and a target, uni-directionally and reciprocally, on AIX, Linux, Windows, and z/OS platforms



HPE Shadowbase Sample Architectures for IBM Db2®

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HPE Shadowbase IBM Db2® on ALW replication to NonStop

Uni-dir IBM Db2 on ALW source replication to HPE NonStop target

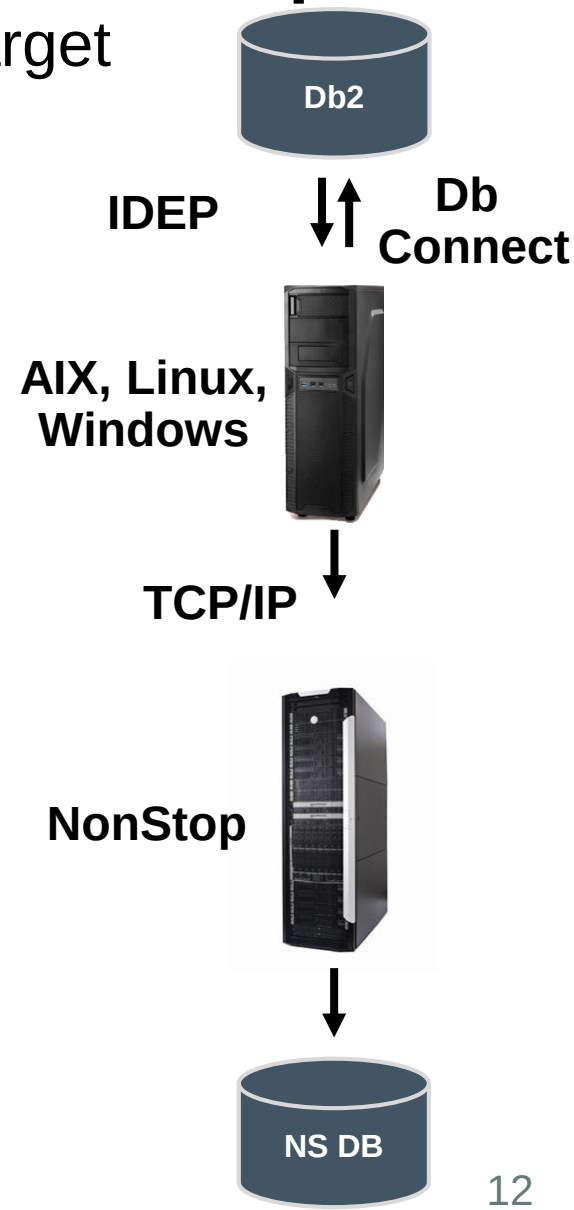
Uses *IBM InfoSphere Data Event Publisher* (IDEP) on the ALW (AIX, Linux, Windows) system to extract the Db2 changes and deliver them to IBM MQ Series for transport

Uses *IBM MQ Series* to deliver the Db2 changes to Shadowbase on the ALW system

Shadowbase on the ALW system receives the MQ changes, then forwards them to the NonStop target using TCP/IP

Then, Shadowbase on the NonStop applies the changes into the target database (Enscribe, SQL/MP, SQL/MX)

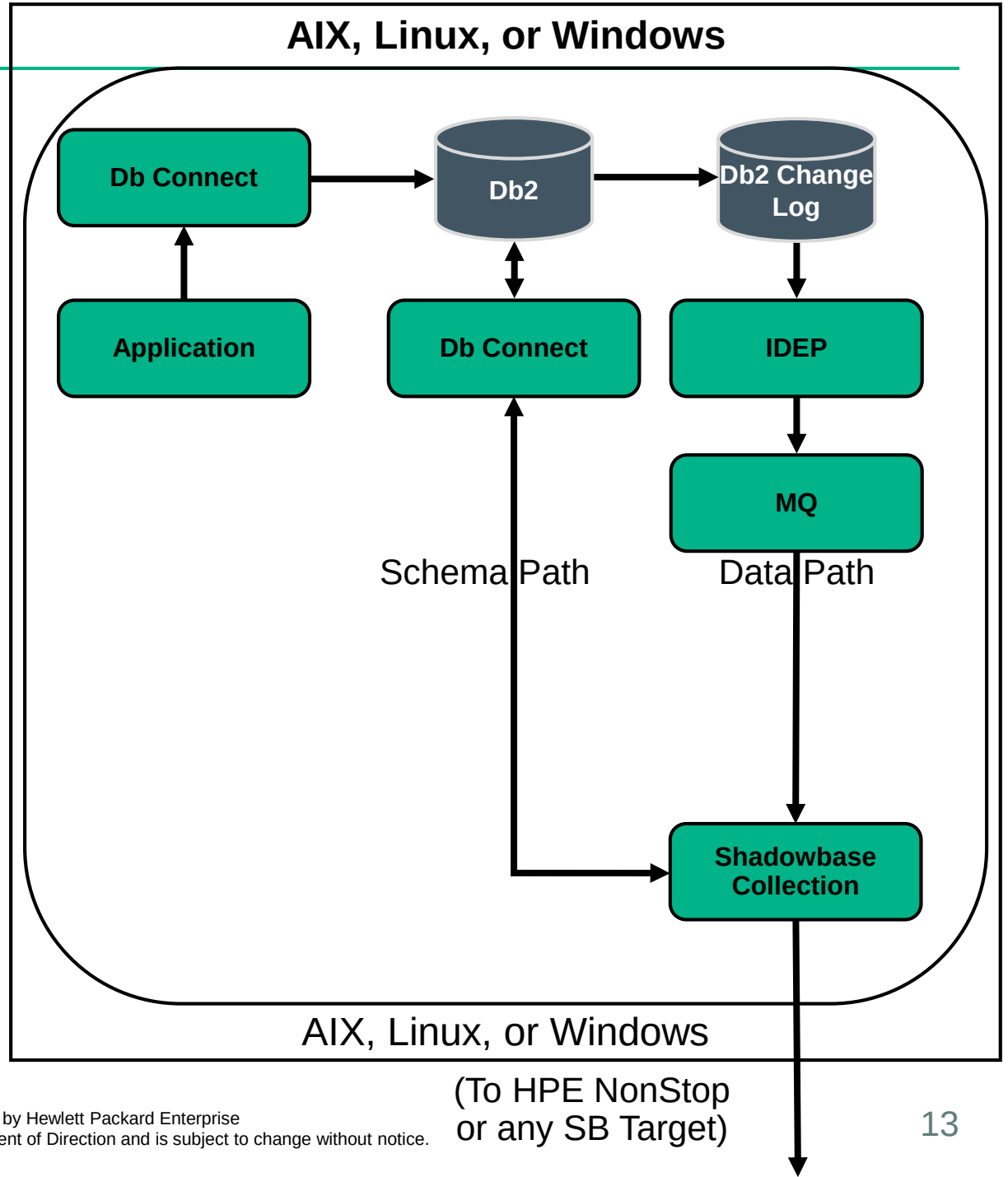
Note: Shadowbase on the ALW system must have a Db2 client connection (Db Connect) into the Db2 source database to extract the Db2 table schema information



Enhanced IBM Db2® Support

From Db2 on AIX, Linux, or Windows to HPE NonStop (1)

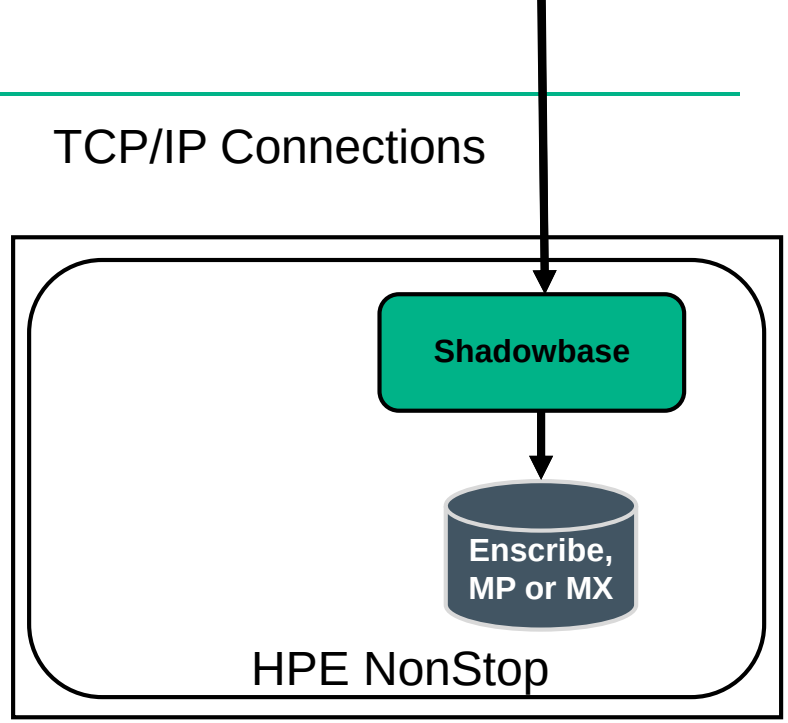
- This example shows HPE Shadowbase replication from an AIX, Linux, or Windows source Db2 database into an HPE NonStop target environment
- The Application updates the *Db2* database
- Changes to the *Db2* database are recorded in the *Db2 Change Log*
- Then, IBM InfoSphere Data Event Publisher publishes the Db2 changes to an MQ queue
- MQ delivers the changes and Shadowbase Collection reads the changes from the MQ queue
  - Shadowbase uses Db Connect to retrieve table schema information for tables it has not received/processed previously
- Shadowbase Collection then forwards the changes to any supported Shadowbase target environment (a NonStop in this example)



Enhanced IBM Db2® Support

From Db2 on AIX, Linux, or Windows to HPE NonStop (2)

– Shadowbase on the NonStop receives the changes and applies them into the *NonStop database*



HPE Shadowbase Db2® on z/OS replication to NonStop

Uni-dir IBM Db2® on z/OS source replication to HPE NonStop target

No HPE Shadowbase components are required/installed on the z/OS environment

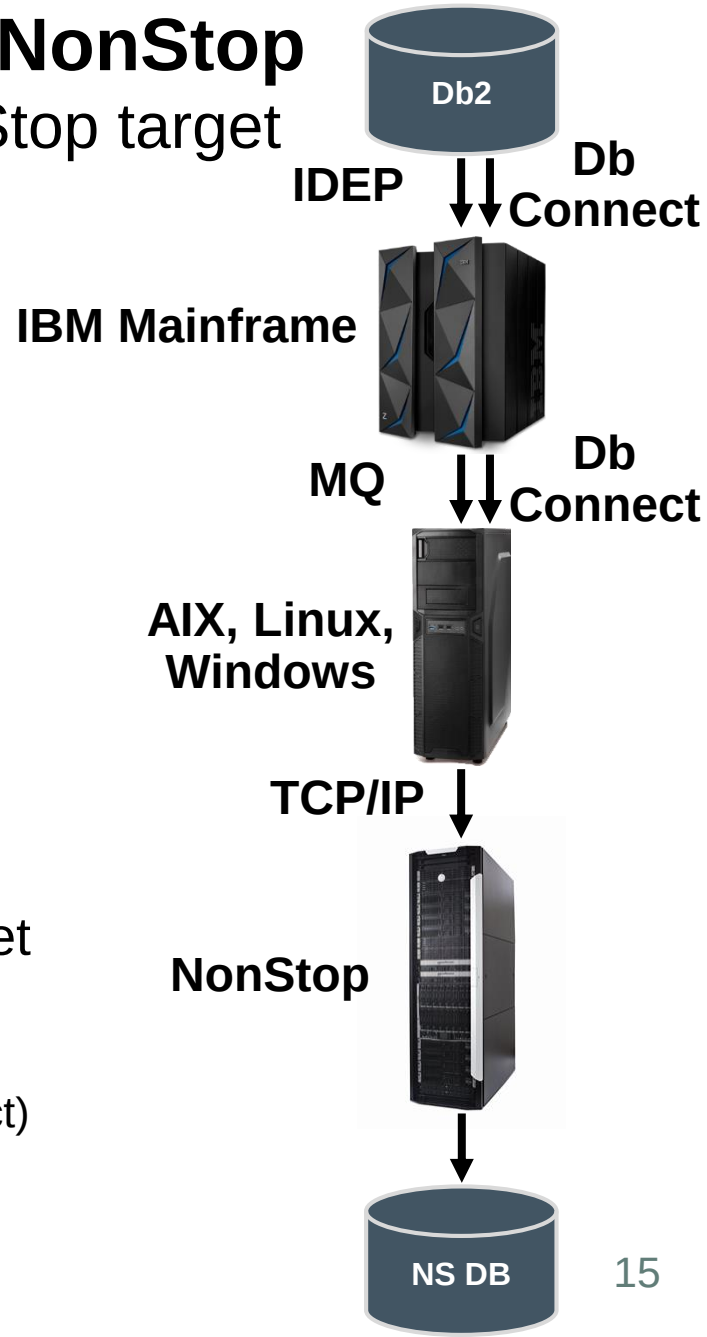
Uses *IBM InfoSphere Data Event Publisher* (IDEP) on z/OS to extract Db2 changes and sends them to MQ Series for transport

Uses *IBM MQ Series* on z/OS to deliver the Db2 changes to the ALW (AIX, Linux, Windows) system (data appliance)

Shadowbase runs on the ALW system and receives the MQ changes, then forwards them to the NonStop target using TCP/IP

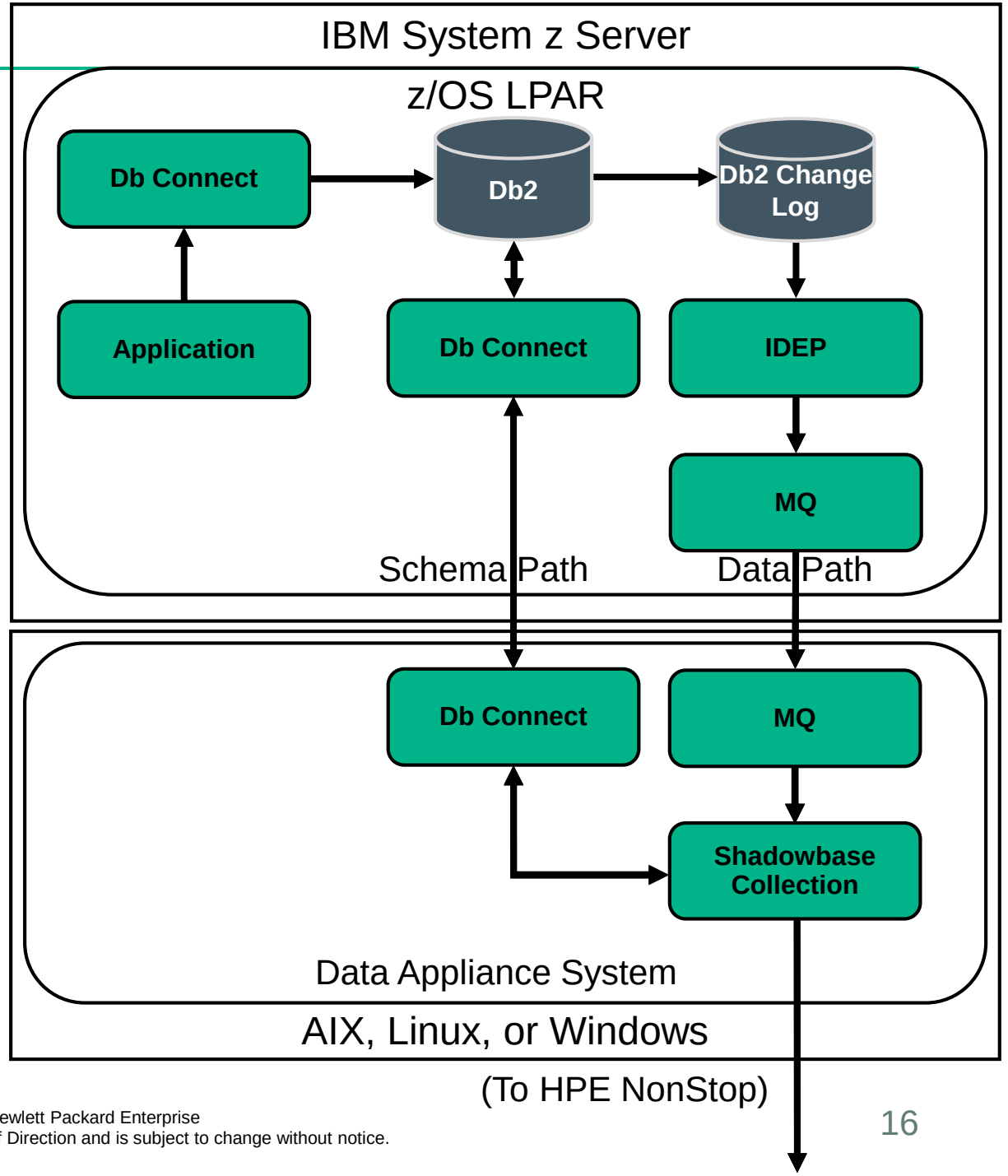
Then, Shadowbase on the NonStop applies the changes into the target database (Enscribe, SQL/MP, SQL/MX)

Note: Shadowbase on the ALW system must have a Db2 client connection (Db Connect) into the Db2 source database to read the Db2 table schema information



Enhanced IBM Db2® Support
From Db2 on z/OS to HPE NonStop (1)

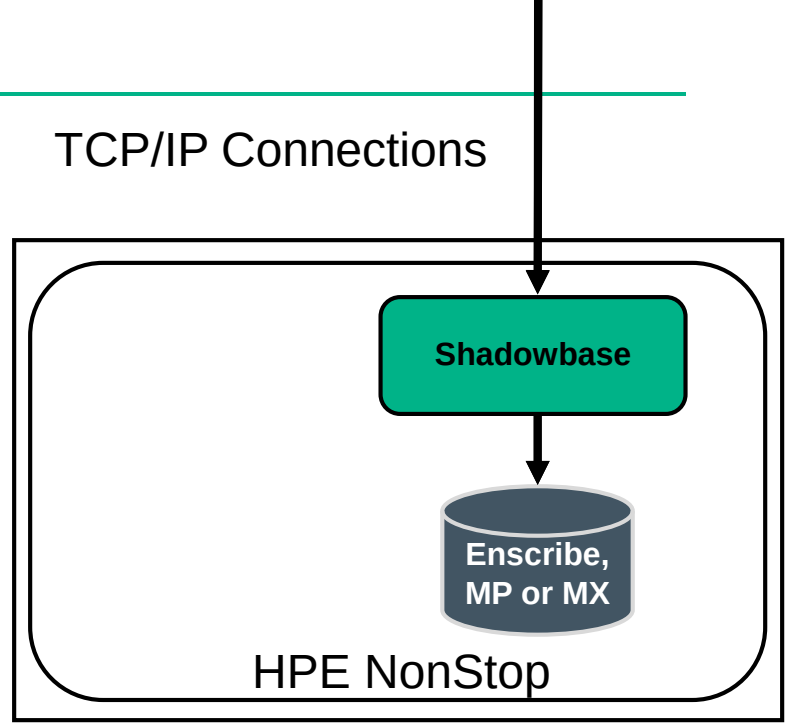
- This example shows HPE Shadowbase replication from an IBM z/OS mainframe Db2 source database into an HPE NonStop target environment
- When the *Db2* database is on a platform other than AIX, Linux, or Windows (e.g., z/OS), HPE Shadowbase runs on an intermediate *Data Appliance System* that has the MQ API and Db2 client access to the database
- The Mainframe Application updates the *Db2 database*
- *Db2* changes are recorded in the *Db2 Change Log*
- Then, IBM InfoSphere Data Event Publisher publishes the *Db2 changes* to an MQ queue located on an intermediate data appliance (AIX/Linux/Windows)
- Shadowbase Collection on the intermediate data appliance reads the changes from the MQ queue and forwards them to the *NonStop*
  - Shadowbase uses Db Connect to retrieve table schema information for tables it has not received/processed previously



Enhanced IBM Db2® Support

From Db2 on z/OS to HPE NonStop (2)

– Shadowbase on the NonStop receives the changes and applies them into the *NonStop database*



HPE Shadowbase NonStop replication to IBM Db2® on ALW

Uni-dir HPE NonStop source replication to IBM Db2 on ALW target

Shadowbase on the NonStop extracts TMF database changes (Enscribe, SQL/MP, SQL/MX)

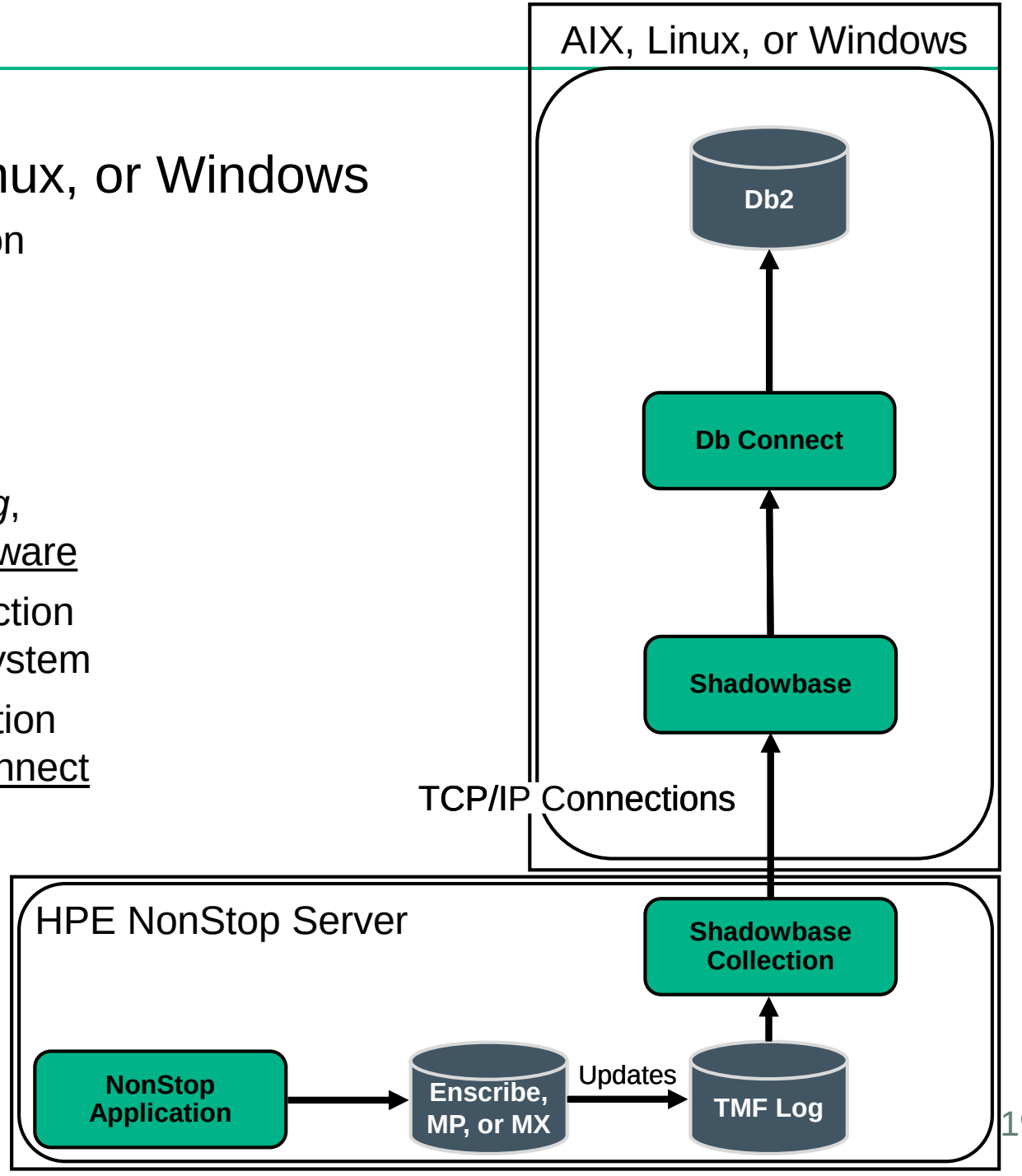
Then, Shadowbase forwards the changes over TCP/IP to the ALW (AIX, Linux, Windows) system

Shadowbase on the ALW system uses a Db2 Client Connection (Db Connect) to apply the changes into the Db2 target database

Enhanced IBM Db2® Support

From HPE NonStop to Db2 on AIX, Linux, or Windows

- This example shows HPE Shadowbase replication from an HPE NonStop source database to a Db2 target database on AIX, Linux, or Windows
- NonStop Application updates audited *Enscribe, SQL/MP, or SQL/MX* source tables
- These changes are recorded in the *TMF audit log*, which is read by the Shadowbase Collection software
- The changes are then sent over a TCP/IP connection to Shadowbase on the AIX, Linux, or Windows system
- Shadowbase applies the changes, using transaction semantics, into the *Db2 database* using a Db Connect connection



HPE Shadowbase NonStop replication to IBM Db2® on z/OS

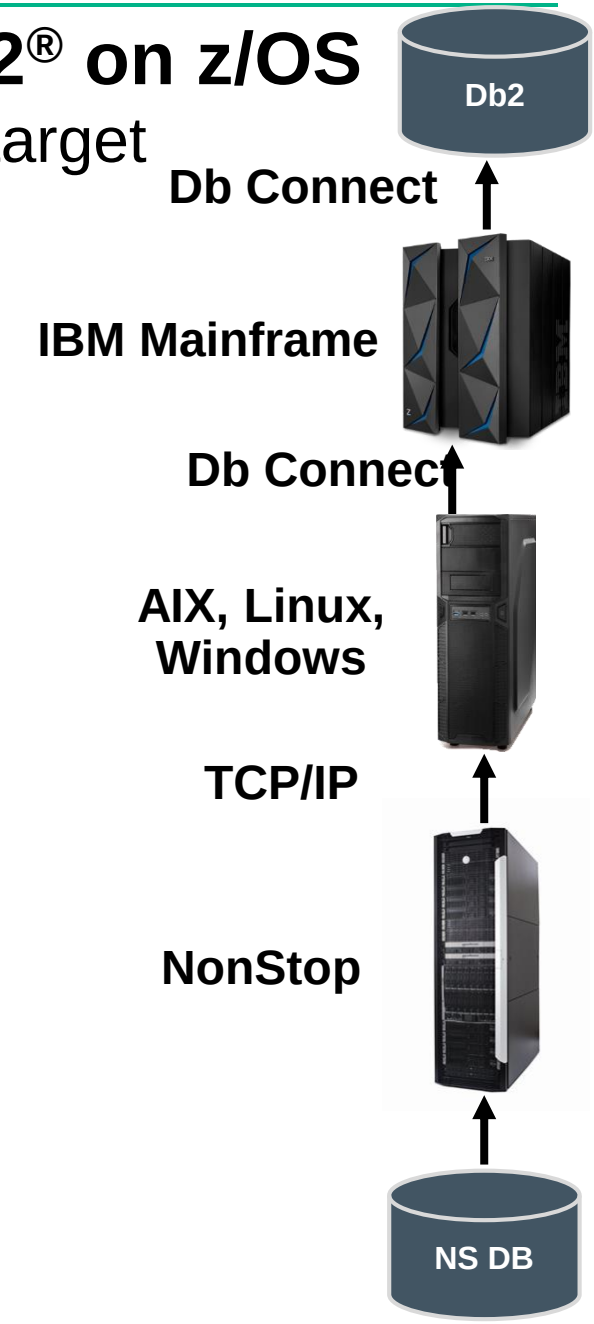
Uni-dir HPE NonStop source replication to IBM Db2 on z/OS target

No HPE Shadowbase components are required/installed on the z/OS environment

Shadowbase on the NonStop extracts TMF database changes (Enscribe, SQL/MP, SQL/MX)

Then, Shadowbase forwards the changes over TCP/IP to the ALW (AIX, Linux, Windows) system (data appliance)

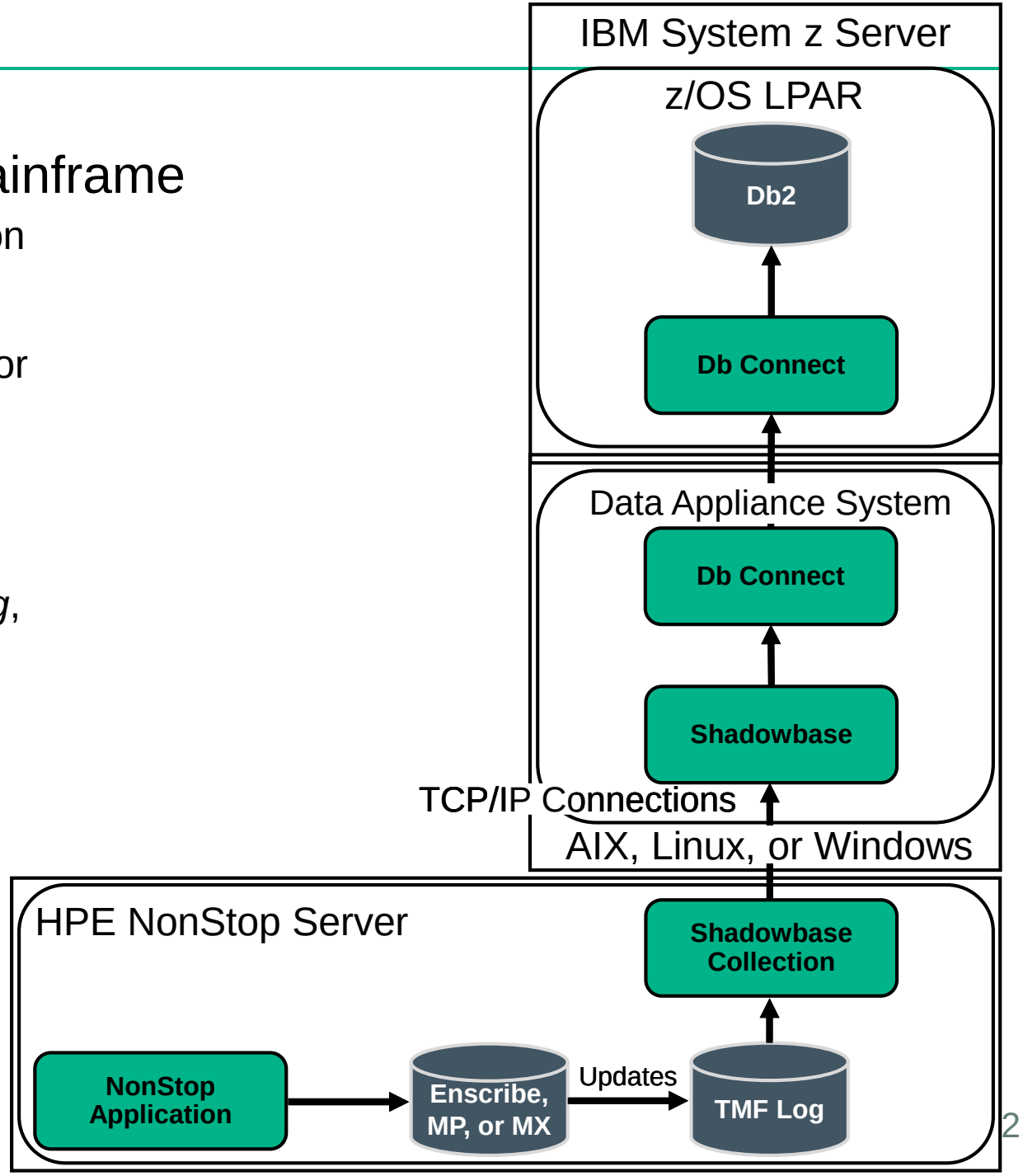
Shadowbase on the ALW system uses a Db2 Client Connection (Db Connect) to apply the changes into the Db2 target database on z/OS



Enhanced IBM Db2® Support

From HPE NonStop to Db2 on IBM Mainframe

- This example shows HPE Shadowbase replication from an HPE NonStop source database to a Db2 target database on an IBM mainframe z/OS environment. Note that it will use an AIX, Linux, or Windows "data appliance" system for the Shadowbase processes
- NonStop application updates audited *Enscribe, SQL/MP, or SQL/MX* source tables
- These changes are recorded in the *TMF audit log*, which is read by the Shadowbase Collection software
- The changes are then sent over a TCP/IP connection to the Shadowbase software running on a Linux, Unix, or Windows *Data Appliance System*
- Shadowbase software on the data appliance system applies the changes, using transaction semantics, into the *Db2 database* using a Db Connect connection



HPE Shadowbase Access into IBM Db2® – A Closer Look

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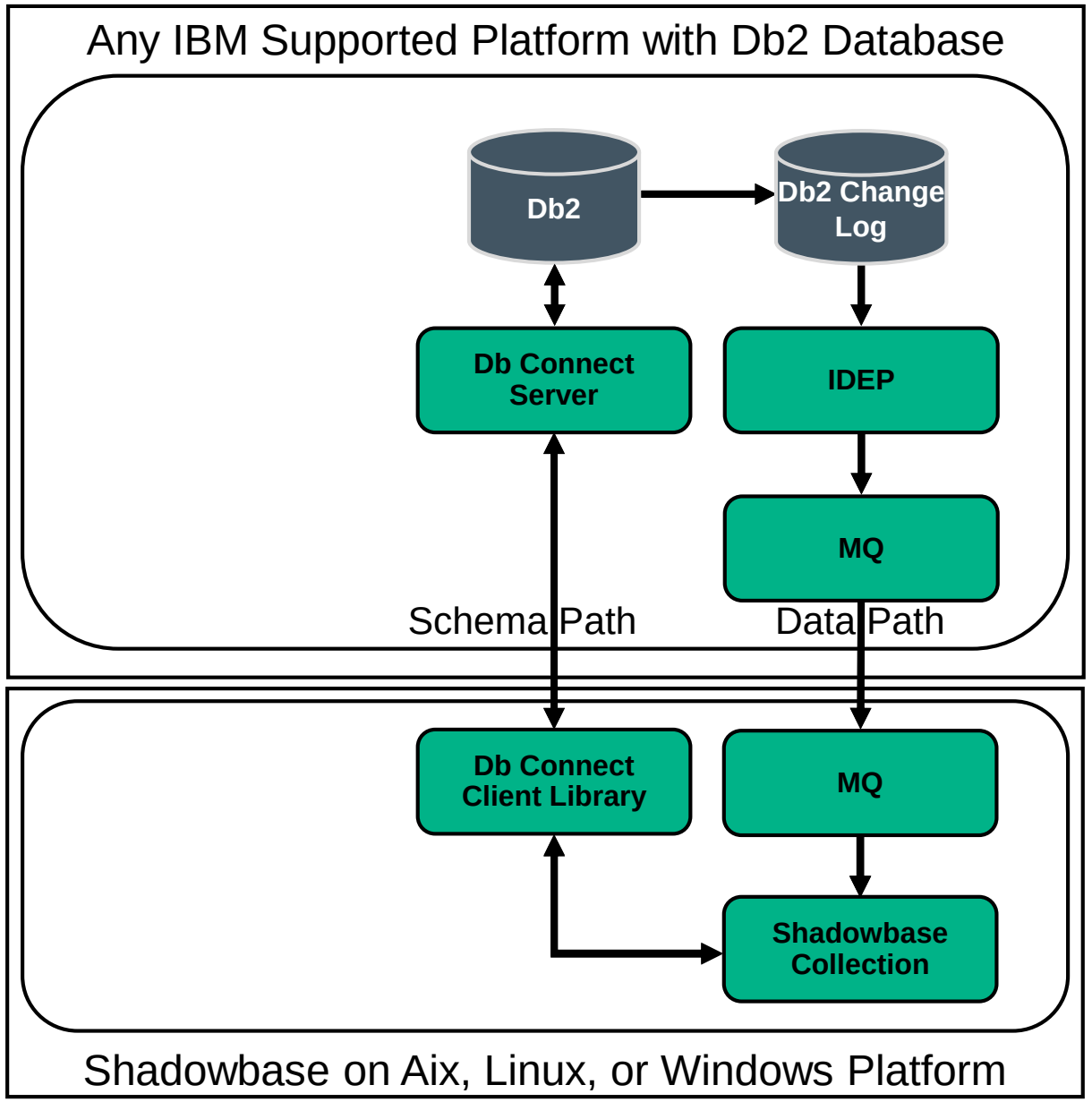
HPE Shadowbase Access into IBM Db2® – A Closer Look (1)

As a Replication Source

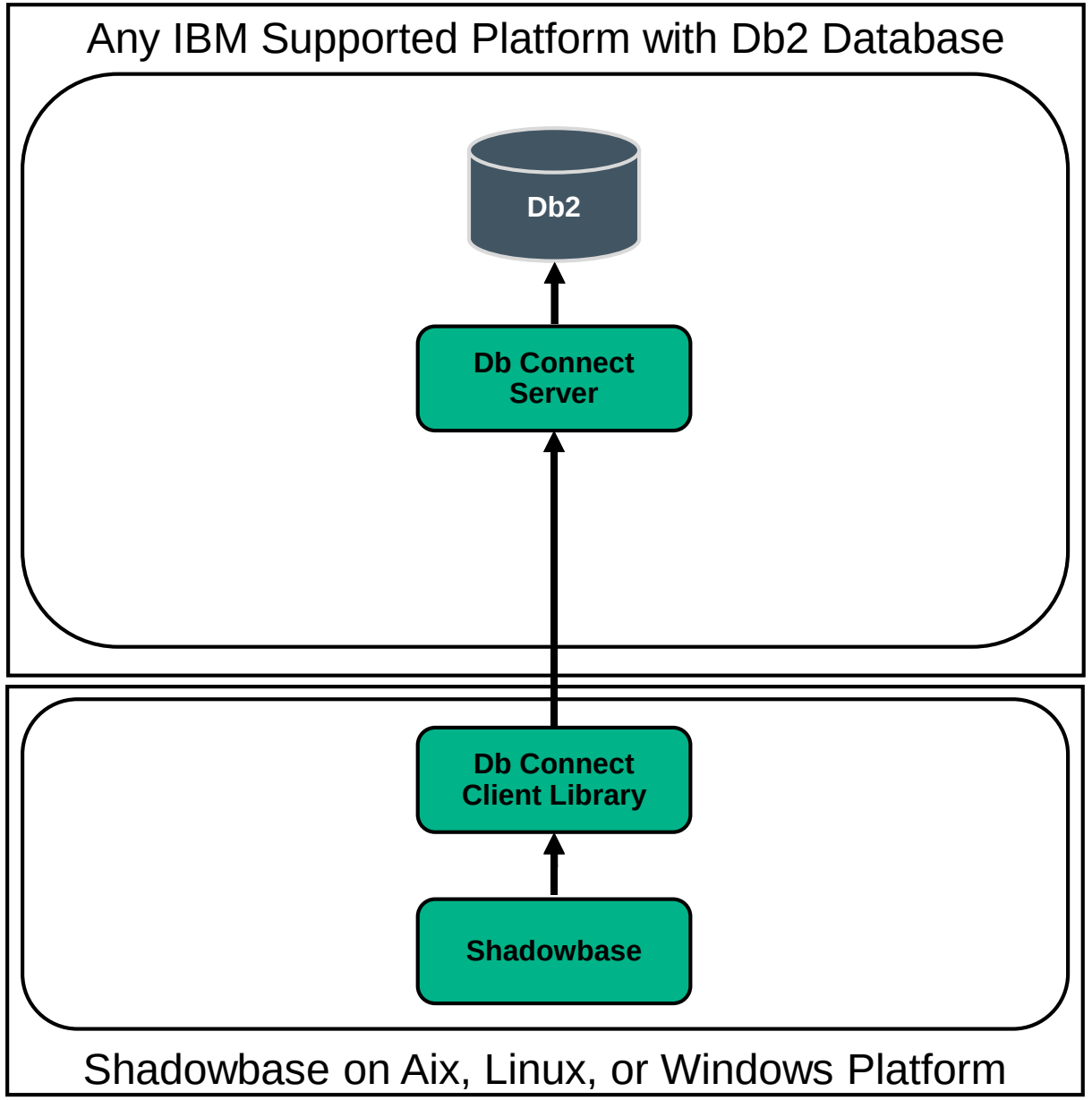
- The Db2 database (along with IDEP and MQ) can reside on any platform that IBM supports
- IDEP extracts the Db2 database changes, and uses MQ to deliver the changes to Shadowbase
- Shadowbase uses the Db Connect Client Library to read the Db2 catalog to retrieve the table schema information for the tables being replicated
- With this release, Shadowbase must run on an AIX, Linux, or Windows platform that has access to MQ and the Db Connect Client Library



HPE Shadowbase Access into IBM Db2® – A Closer Look (2)

As a Replication Target

- The Db2 database can reside on any platform that IBM supports
- Shadowbase uses the Db Connect Client Library to write the replicated events into the Db2 database
- With this release, Shadowbase must run on an AIX, Linux, or Windows platform that has access to the Db Connect Client Library



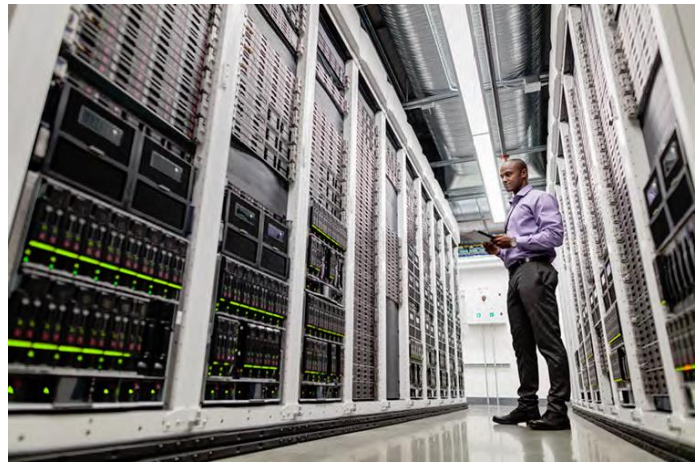
HPE Shadowbase Access into IBM Db2® – A Closer Look (3)
FAQs

- Can Shadowbase run on the SAME platform as the Db2 database?
  - Yes, if that platform is an AIX, Linux, or Windows platform
  - No, otherwise
- Can Shadowbase run on a z/OS mainframe environment?
  - At this time, Shadowbase has not been ported to run directly on z/OS
- Are there any plans to port Shadowbase to a z/OS mainframe environment?
  - Yes, we are considering z/OS in the future
- Can Shadowbase running on a NonStop directly write to or read from Db2?
  - MQ is available on a NonStop, however the Db Connect Client Library is not
  - Shadowbase must run on a platform where the Db Connect Library is available
  - At this time, this means an AIX, Linux, or Windows platform

Current HPE Shadowbase Requirements for IBM Db2®

Current HPE Shadowbase Requirements for IBM Db2®

- Support for uni-directional and reciprocal replication only (no bi-directional support yet)
  - With this release, a Db2 table can be either a source or a target but not both at the same time
- For Db2 source replication
  - Shadowbase uses IBM InfoSphere Data Event Publisher (IDEP) to extract the Db2 database changes from the Db2 journal and then uses IBM MQ to deliver the changes to Shadowbase
  - Shadowbase also needs access to the Db2 catalog through a Db Connect connection to read the Db2 SQL table schema information
  - Hence, Shadowbase must run on an AIX, Linux, or Windows platform
- For Db2 target replication
  - Shadowbase must run on either an AIX, Linux, or Windows platform
  - Shadowbase will use Db Connect to apply the changes into the Db2 target database (wherever that target database is located)



HPE Shadowbase Pricing and PIDs for IBM Db2®

For HPE Shadowbase Db2 as a target on AIX, Linux, or Windows:

- Use the existing WSA* PIDs (see *HPE Shadowbase Ordering Guide*)

For HPE Shadowbase Db2 as a source on AIX, Linux, or Windows:

- Business Continuity: Use existing WSA49V6T1/T2 (uni-dir) PID
- Data or Application Integration: Use existing WSA51V6T1/T2 (uni-directional) PID

Note: Set the “T1” or “T2” suffix using the same rules as other “Other Server” platforms:

- Use T1 if the number of cores or the VM’s logical/virtual processor count is 1-8
- Use T2 if the number of cores or the VM’s logical/virtual processor count is > 8

For HPE Shadowbase Db2 as a source or target on any other platform requiring the Data Appliance approach:

- Use the same PIDs/rules as described above for the AIX, Linux, or Windows data appliance system

Possible Future HPE Shadowbase Enhancements for IBM Db2®

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Possible Future HPE Shadowbase Enhancements for IBM Db2®

- Support for bi-directional replication (a table can act as both a source and a target)
- For z/OS, remove the requirement for an intermediate data appliance
  - Port Shadowbase into z/LINUX running as a VM in the z/OS environment
  - Continue to use IBM InfoSphere Data Event Publisher and MQ for delivery into Shadowbase in the z/Linux VM
  - Use TCP/IP connections from the z/Linux VM to send the data off the mainframe to the target Shadowbase environment
- Ultimately, eliminate IBM InfoSphere Data Event Publisher and MQ and read the Db2 journal directly; Shadowbase will then deliver the changes to the target environment directly over TCP/IP connections*

***Note:** **Porting Shadowbase to run directly on the z/OS mainframe's z/Linux environment will be released as a new product and will require new HPE PIDs and HPE Shadowbase pricing.**

Future functionality is not guaranteed.

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Thank you

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