Quest™

Foglight® for Databases 6.0.0

Monitoring Database Systems

Deployment Guide

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Legend

WARNING: A WARNING icon indicates a potential for property damage, personal injury, or death.

CAUTION: A CAUTION icon indicates potential damage to hardware or loss of data if instructions are not followed.

IMPORTANT NOTE, **NOTE**, **TIP**, **MOBILE**, or **VIDEO:** An information icon indicates supporting information.

Foglight® for Databases Deployment Guide
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1

Deployment pre-requisites

Welcome to the *Foglight for Databases Deployment Guide*. This guide provides the pre-requisites for optimal deployment, to ensure the best user experience possible.

This section describes important deployment information required to monitor the leading RDBMS: Oracle®, SQL Server®, SAP ASE®, DB2 for LUW, and Azure® SQL.

Architecture

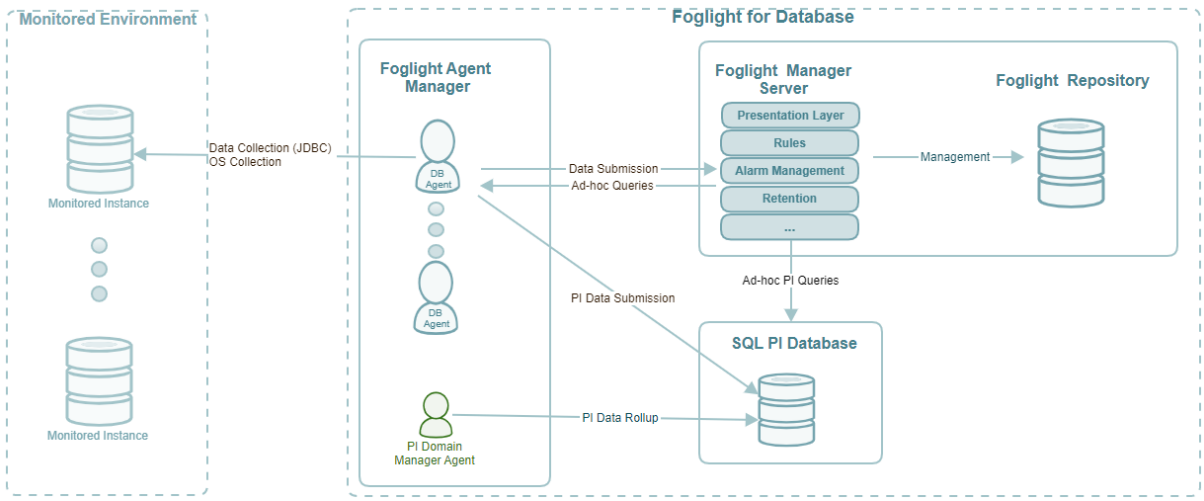
There are three main components:

- **Foglight Management Server** and **Foglight Repository** — Responsible for managing, alerting, and viewing the collected data. Both components can be set to run on the same machine or reside on separate machines.
- **Foglight Agent Manager (FglAM)** — Hosts the monitoring database agents (also known as **DB Agent**) and SQL PI domain manager agent.
- **SQL PI Database** — Refers to a SQL Server database under a SQL Server instance that holds PI collected data.

  A single repository can hold up to 300 agents for a specific domain (for example, SQL Server, Oracle, SSAS). Multiple repositories can reside on a single SQL Server instance.

  The total number of monitored instances on a single SQL Server instance is limited to 600.

Figure 1. Foglight for Databases Components



Data Collection (JDBC)	
SQL Server	1433
Oracle	1521
DB2 (LUW)	50000
Azure SQL Database	1433
SAP ASE	5000
Analysis Services	2383 (Default Instance) 2382 (Named Instance)

OS Collection	
Windows, WMI	135
Windows, WinRM	5985 (HTTP), 5986(HTTPS)
Unix/Linux, SSH	22

Data Submission	
HTTP	8080
HTTPS	8443

Ad-hoc Queries	
SQL Server	3235
Oracle	3723
DB2 (LUW)	3725
Azure SQL Database	3260

PI Data Submission	1433
Ad-hoc PI Queries	1433
PI Data Rollup	1433

NOTE:

- A single FglAM can handle up to 800 DB agents.
- A single FglAM can handle one PI domain manager agent per domain. Currently, it is up to 4 (SQL Server, Azure SQL Database, Oracle, SSAS).
- Each PI domain manager agent can monitor up to 300 instances for a single domain (For example, SQL Server, Oracle, SSAS).
- Each PI domain manager can save data into a single repository.

Examples

Refer to the following examples for detailed information:

Example 1

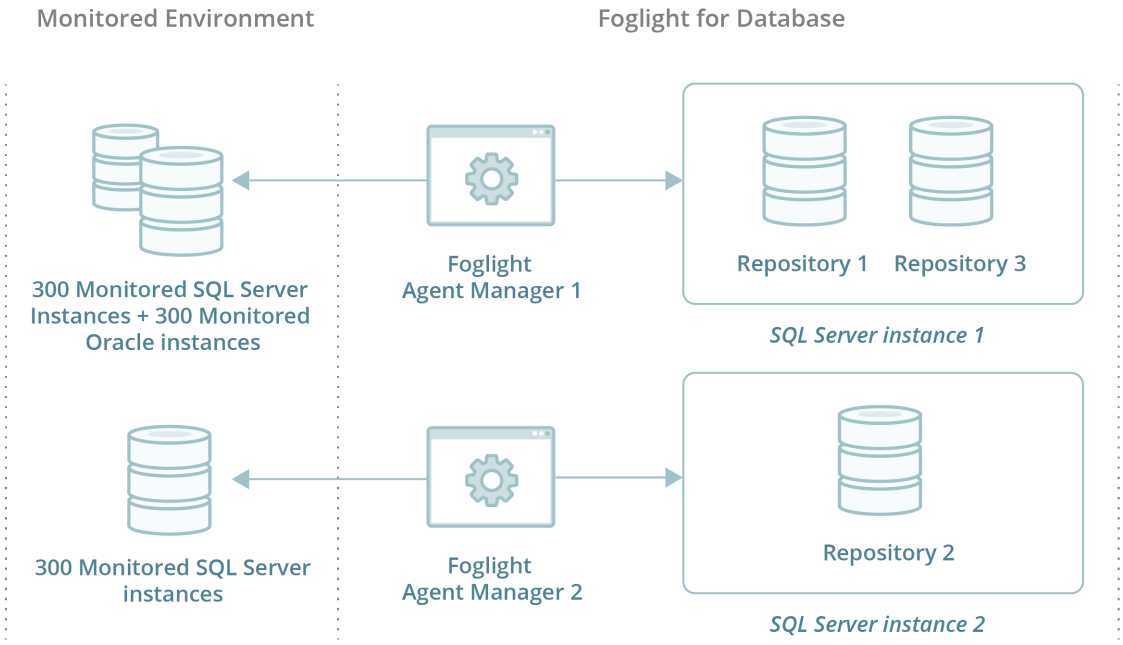
To monitor 100 SQL server instances, 120 Oracle instances, and 15 SSAS instances, all including PI:

- FglAM 1:
  - 100 SQL server DB agents monitor the 100 SQL server instances.
  - 120 Oracle DB agents monitor the 120 Oracle instances.
  - 15 SSAS DB agents monitor the 15 SSAS instances.
  - 3 PI domain manager agents – each managing a single domain – SQL Server, Oracle, SSAS.
- SQL Server Instance 1:
  - PI repository 1 – database for saving the PI data of 100 SQL server instances.
  - PI repository 2 – database for saving the PI data of 120 Oracle instances.
  - PI repository 3 – database for saving the PI data of 15 SSAS instance.

Example 2

To monitor 600 SQL server instances and 300 Oracle instances, all including PI:

- FglAM 1:
  - 300 SQL server DB agents monitor 300 SQL server instances.
  - 300 Oracle server DB agents monitor 300 Oracle instances.
  - 2 PI domain agent managers – one manages the SQL server instances while the other manages the Oracle instances.
- FglAM 2:
  - 300 SQL Server db agents monitor the 300 SQL Server instances.
  - 1 PI domain agent manager collects PI data from the 300 SQL Server instances.
- SQL Server instance 1:
  - PI repository 1 – database for saving PI data from 300 monitored SQL Server instances.
  - PI repository 2 - database for saving PI data from 300 monitored Oracle instances.
- SQL Server instance 2:
  - PI repository 3 – database for saving PI data from 300 monitored SQL Server instances.



Deployment in Centralized vs Distributed

In monitoring environments that exceed a total of 20 agents, a distributed installation is necessary:

- The FMS should be installed on a dedicated server.
- External FglAMs should be used for DB Agents and with each installed on a dedicated server.
- Each instance of the SQL PI repository should be installed on a separate server.

In All-in-One installations on virtual machines (VMs), the machine is highly recommended to reserve CPU and Memory for better performance.

Once the total number of agents exceeds 20, All-in-One installations are no longer supported.

Hardware requirements

Identify your hardware requirements, which are determined by whether SQL PI is configured and by the number of monitoring agents.

- SQL PI configured
- SQL PI not configured

NOTE: The Numbers of agents refers to DB agents. The Infrastructure Cartridge (IC) agent's resources are included within the DB agent resource calculations. Sizing requirements are exclusively for Foglight components and these resources should not compete with any other resources required for the operation system (OS) or applications installed on the same system.

SQL PI configured

SQL PI is available only for Oracle, SQL Server, SQL Server BI (Analysis services), and Azure SQL Database. These tables define the Hardware requirements for each server based on the number of monitoring agents

After locating your hardware requirements in each table, ensure that you complete the manual JVM Setting configuration as described in:

- Manual configuration requirement for SQL PI Repository

Foglight Management Server

Table 1. Foglight Management Server with SQL PI configured

Number of Agents	<5	<50	<100	<200	<400	<600	<800
CPUs (2.4GHz)*	2 cores	4 cores	4 cores	4 cores	4 cores	6 cores	8 cores
RAM*	9GB	11GB	11GB	13GB	15GB	19GB	21GB
JVM Settings**	4096MB	4096MB	4096MB	6144MB	8192MB	10240MB	14336MB
Hard Drive Space	10GB	100GB	200GB	400GB	800GB	1200GB	1600GB

CPUs (2.4GHz)* — for a virtual machine the CPU reservation is highly recommended for better performance. The reservation is expressed in MHz.

RAM*- for a virtual machine the memory reservation is highly recommended for better performance.

Foglight Agent Manager

Table 2. Foglight Agent Manager

Number of Agents	<5	<50	<100	<200	<400	<600	<800
CPUs (2.4GHz)*	1 core	4 cores	8 cores	8 cores	10 cores	12 cores	14 cores
RAM*	5GB	11GB	15GB	19GB	23GB	29GB	37GB
JVM Settings**	2048MB	7168MB	9216MB	13312MB	17408MB	23552MB	31744MB
Hard Drive Space	2GB	5GB	10GB	20GB	40GB	60GB	80GB

IMPORTANT: If you are monitoring more than 70 agents running on Windows systems, the monitored hosts should be configured to use WinRM. Monitoring Analysis services is supported only on Agent Managers running on Windows which must have a version of .NET 3.5 installed.
It is highly recommended to deploy the SQL PI agents to the Agent Manager where database agents are hosted.

IMPORTANT: For each PI domain manager agent, additional 1024MB RAM and JVM are required. The resource for PI repository manager agent can be ignored.

IMPORTANT: For the environment with SQL PI configured, a single FglAM can only connect to a single PI repository database per domain and monitor agent number no exceed to 300 in a single domain.

CPUs (2.4GHz)* - for a virtual machine the CPU reservation is highly recommended for better performance. The reservation is expressed in MHz.

RAM*- for a virtual machine the memory reservation is highly recommended for better performance.

SQL PI Repository Instance

Microsoft SQL Server Version and Edition

Standard or Enterprise	Microsoft SQL Server 2016 for Windows*
	Microsoft SQL Server 2017 for Windows
	Microsoft SQL Server 2019 for Windows
	Amazon RDS for SQL Server 2016*
	Amazon RDS for SQL Server 2017
	Azure SQL Managed Instance*

Microsoft SQL Server 2016 for Windows* - Requires SP1 or SP2 for SQL Server 2016 Standard edition.

Amazon RDS for SQL Server 2016* - Requires SP1 or SP2 for SQL Server 2016 Standard edition.

NOTE: Support to install PI repository on SQL Server Always On Availability Group. For more information, see KB326158.

Azure SQL Managed Instance*

NOTE: In the 5.9.7.21 and lower releases of the database cartridge the SQL PI repository cannot be created on an Azure SQL Managed Instance. To fix this issue, refer to KB330378.

Antivirus Exclusions

Antivirus exclusions is required for the Microsoft SQL Server. For more information refer to the Microsoft's official article How to choose antivirus software to run on computers that are running SQL Server.

Table 3. SQL PI Repository

Number of Agents	<50	<100	<200	<300	<600
CPUs (2.4GHz)*	4 cores	4 cores	6 cores	6 cores	8 cores
RAM*	20GB	32GB	42GB	60GB	64GB
Maximum SQL Server Memory	16384MB	26624MB	36864MB	55296MB	59392MB
Hard Drive Space*	Total 112GB One disk • Raw Data*: 10GB • Long-Term Data*: 100GB • Transaction Log*: 2GB	Total 224GB Two disks • Disk 1 raw data: 20GB Transaction Log*: 4GB • Disk 2 long-term data: 200GB	Total 383GB Two disks • Disk 1 raw data: 25GB Transaction Log*: 8GB • Disk 2 long-term data: 350GB	Total 547GB Two disks • Disk 1 raw data: 35GB Transaction Log*: 12GB • Disk 2 long-term data: 500GB	Total 1110GB Two disks • Disk 1 raw data: 80GB Transaction Log*: 30GB • Disk 2 long-term data: 1000GB

NOTE: When there are multiple repository databases, it is recommended for each to use a separate set of disks.

NOTE: For Oracle RAC, only the individual nodes for number of agents are counted instead of the RAC itself.

RAM*- for a virtual machine the memory reservation is highly recommended for better performance.

Hard Drive Space* - the disk RPM is 15K. For 100 DB agents or above, RAID 5 disk (IOPS is above 1.2K) is required if the performance is downgraded. For 600 DB agents, 9K IOPS disk is required. For Azure SQL Managed instance 12500 IOPS per file and throughput 480MiB per file.

Raw Data* - raw performance data which is stored in 1-minute SQL PI tables.

Long-Term Data* - the low granularity data roll-up from raw data. Long-term (non 1-minute) data is stored in the primary filegroup in the SQL PI Repository. It is highly recommended to store database transaction log and temp database in a different disk with long-term data for better disk IO.

Transaction Log* - The frequency of the transaction log backup job is 2 hours.

All-in-One Installation

In the All-in-One installation, the Foglight Agent Manager is embedded. The Foglight Repository and SQL PI Repository are in the same SQL Server instance.

Table 4. All-in-One Installation

Number of Agents	<20
CPUs (2.4GHz)*	6 cores
RAM*	36GB
FMS JVM Settings	4096MB
FGLAM JVM Settings	6144MB
Maximum SQL Server Memory	20480MB
Hard Drive Space*	Total 160GB Two disks • Disk 1 for SQL PI Repository: 60GB • Disk 2 for Foglight Repository: 100GB

CPUs (2.4GHz)* - for a virtual machine the CPU reservation is highly recommended for better performance. The reservation is expressed in MHz.

RAM*- for a virtual machine the memory reservation is highly recommended for better performance.

Hard Drive Space* - the disk RPM is 15K. Extra hard drive space is needed for operating system storage.

SQL PI not configured

The table defines the Hardware requirements based on the number of monitoring agents.

After locating your hardware requirements in the tables, ensure that you complete the manual JVM Setting configuration as described in:

- Manual configuration requirement for SQL PI Repository

Foglight Management Server

Table 5. Foglight Management Server

Number of Agents	<5	<100	<200	<400	<600	<800
CPUs (2.4GHz)*	2 cores	4 cores	4 cores	4 cores	6 cores	8 cores
RAM*	6GB	8GB	10GB	12GB	16GB	18GB

Table 5. Foglight Management Server

Number of Agents	<5	<100	<200	<400	<600	<800
JVM Settings**	4096MB	4096MB	6144MB	8192MB	10240MB	14336MB
Hard Drive Space	10GB	200GB	400GB	800GB	1200GB	1600GB

IMPORTANT: For Foglight for DB2 LUW, the number of agents that can be hosted on a Management Server depends on the size of the environment and the amount of memory allocated for the Management Server. Instances, databases, and members each count toward the number of agents. For example, one instance with two databases and two members counts as five agents (1+2+2=5). Therefore, refer to the first column for the size of the environment and the amount of memory required. If you require more agents than can be supported by one Management Server, add additional Management Servers.

CPUs (2.4GHz)* - for a virtual machine the CPU reservation is highly recommended for better performance. The reservation is expressed in MHz.

RAM*- for a virtual machine the memory reservation is highly recommended for better performance.

Foglight Agent Manager

Table 6. Foglight Agent Manager

Number of Agents	<5	<100	<200	<400	<600	<800
CPUs (2.4GHz)*	1 core	2 cores	4 cores	4 cores	6 cores	8 cores
RAM*	1GB	4GB	6GB	10GB	14GB	18GB
JVM Settings**	256MB	2048MB	4096MB	8192MB	12288MB	16384MB
Hard Drive Space	2GB	5GB	10GB	20GB	30GB	40GB

IMPORTANT: If you are monitoring more than 70 agent running on Windows system, the monitored hosts should be configured to use WinRM.

IMPORTANT: For Foglight for DB2 LUW, the number of agents that can be hosted on an Agent Manager depends on the size of the environment and the amount of memory allocated on an Agent Manager. Instances, databases, and members each count toward the number of agents. For example, one instance with two databases and two members counts as five agents (1+2+2=5). Therefore, refer to the first column for the size of the environment and the amount of memory required. If you require more agents than can be supported by one Agent Manager, add additional Agent Managers.

CPUs (2.4GHz)* - for a virtual machine the CPU reservation is highly recommended for better performance. The reservation is expressed in MHz.

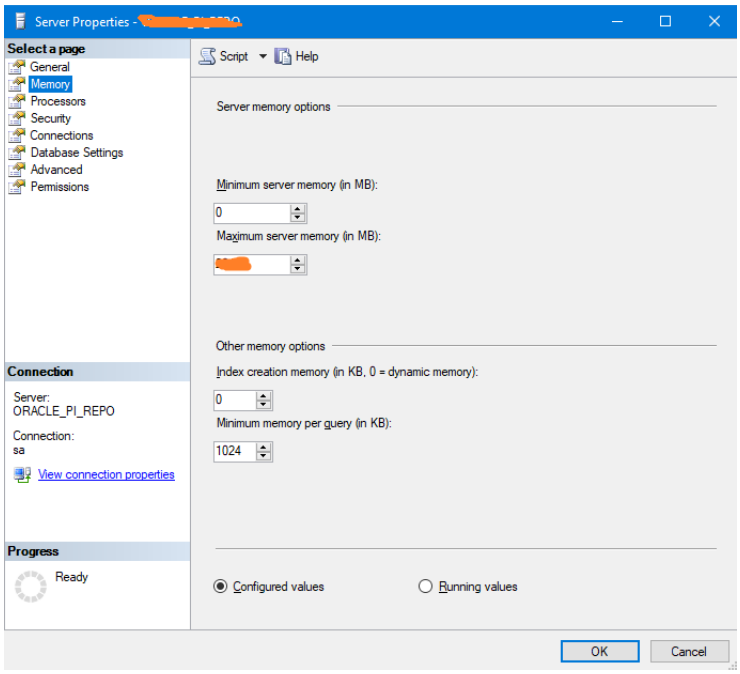
RAM*- for a virtual machine the memory reservation is highly recommended for better performance.

Manual configuration requirement for SQL PI Repository

NOTE: Starting with version 5.9.5.20, the back-end Performance Investigator (PI) repository, Infobright is no longer supported, and a new enhanced PI repository based on SQL Server is introduced. For more information about SQL Server based PI repository installation, refer to KB 289910. For how to migrate SQL Server and Oracle database agents from Infobright to SQL Server based PI repository, refer to KB 313191.

Set Maximum SQL Server Memory

Log in to the SQL Server through SSMS client. Edit the *Maximum server memory* in Server Properties dialog. For SQL PI Agents number less than 50, set the Maximum SQL Server Memory to 16384 MB. For All-in-One installation, refer to Table 4 *row Maximum SQL Server Memory*. For others, refer to Table 3 row *Maximum SQL Server Memory.*



Foglight Management Server, JVM Settings **

Edit the *server.config* file located under the *<Foglight installation directory>\config directory*.

For 4096MB, add the following lines:

```
server.vm.option0 = "-Xms4096m";
server.vm.option1 = "-Xmx4096m";
```

Foglight Agent Manager, JVM Settings **

Edit the *baseline.jvmargs.config* file located under the *<Agent Manager installation directory>\state\default\config\ directory*

For 2048MB, add the following lines:

```
vmparameter.0 = "-Xms2048m";
vmparameter.1 = "-Xmx2048m";
```

Other settings

For number of agents > 50, edit these settings:

- **Data submission channel** — edit the *fglam.config.xml* file located under the *<Agent Manager installation directory>\state\default\config* directory

  Alter the following lines:

  ```
  config:upstream attribute max-disk-space="102400"
  ```

```
config:downstream attribute max-disk-space="102400"
```

- **Number of OS connections** — edit the *baseline.jvmargs.config* file located under the *<Agent Manager installation directory>\state\default\config* directory

  Increase the number of allowed OS connections:

```
vmparameter.2 = "-Dcom.quest.connection.regulator.maxActiveConnectionsCap=1024";
```

  NOTE: In the example above, "1024" is a placeholder. The suggested value of **maxActiveConnectionsCap** is the number of database agents multiplied by 3.

Supported monitoring platforms

Supported Platforms for the Foglight Management Server

http://support.quest.com/technical-documents/foglight/6.0.0/system-requirements-and-platform-support-guide/supported-platforms/supported-platforms-for-the-management-server

Supported Platforms for Foglight Agent Manager

http://support.quest.com/technical-documents/foglight/6.0.0/system-requirements-and-platform-support-guide/supported-platforms/supported-platforms-for-the-agent-manager

Supported monitored databases

Table 7. Supported Monitored Databases

Oracle®	Oracle Database 10g[1] Oracle Database 11g Oracle Database 12c Oracle Database 18c Oracle Database 19c
SQL Server®	Microsoft® SQL Server: 2005, 2008, 2008 R2, 2012, 2014, 2016 Microsoft SQL Server for Windows: 2017, 2019 Microsoft SQL Server for Linux: 2017, 2019 Amazon RDS for SQL Server[2]: 2012, 2014, 2016, 2017 Azure SQL Managed instance
Azure SQL Database	Azure SQL Database V12
SAP ASE®	Adaptive Server Enterprise: 15.x through 16.0 Replication Server: 15.0, 15.1, 15.2, 15.7, 16.0
DB2 for LUW	DB2 version 9.5[3], 9.7, 10.1, 10.5, 11.1, 11.5
MongoDB®	2.4 and above
PostgreSQL®	9.1 and above
MySQL®	5.0 and above
MariaDB®	5.0 and above
Cassandra®	2.1 and above

NOTE:
1. Oracle Database 10g — SQL PI supports version 11g and later.
2. For the Amazon RDS for SQL Server, only Standard and Enterprise version are supported.
3. DB2 version 9.5 — Top SQL dashboard not supported.
Operating Systems — All operating systems supported by the vendor.
Supported Editions — All editions supported by the vendor. Except for SAP Edge and Runtime editions.

Supported monitored BI services

- The same user monitoring the SQL Server database engine must be used to monitor the Integration and Reporting Services.
- The login ID used to monitor the Integration Service must be a user on the SSISDB database. This user ID is created while applying the “Grant permissions” script.
- The ID used to monitor the Integration Services on the database needs to have:
  - the `ssis_admin` role in order to gather all needed information for its collections.
  - the `db_datareader` role on the SSISDB database.
- Monitoring Analysis Services requires system administrator permissions on the Analysis Services instance.
- Monitoring Analysis Services is supported only on Agent Managers running on Windows which must have a version of .Net 3.5 installed.
- No additional permissions are required to monitor the Reporting Services.

Table 8. Supported Monitored BI Services

Integration Services*	Reporting Services*	Analysis Services
Microsoft® SQL Server® 2012	Microsoft SQL Server 2008	Microsoft SQL Server 2008
Microsoft SQL Server 2014	Microsoft SQL Server 2008 R2	Microsoft SQL Server 2008 R2
Microsoft SQL Server 2016	Microsoft SQL Server 2012	Microsoft SQL Server 2012
Microsoft SQL Server 2017 for Windows	Microsoft SQL Server 2014	Microsoft SQL Server 2014
Microsoft SQL Server 2019 for Windows	Microsoft SQL Server 2016	Microsoft SQL Server 2017 for Windows
	Microsoft SQL Server 2017 for Windows	Microsoft SQL Server 2019 for Windows
	Microsoft SQL Server 2019 for Windows	

*SQL Server instance must be monitored to be able to monitor the service.

Operating Systems — All operating systems supported by the vendor.

Supported Editions — All editions supported by the vendor.

PI aggregation and retention

PI manages data using an internal time pyramid; the roll-up process runs every 15 minutes.

Table 9. Time pyramid table

Time resolution	Retention period
1 minute	6 hours
15 minutes	3 days

Table 9. Time pyramid table

Time resolution	Retention period
1 hour	2 weeks
6 hours	30 days
1 day	90 days
1 week	2 years

Permissions for SQL Server Based PI Repository Database

If you are using SQL Server Based PI Repository®, ensure that these permissions are set.

Table 10. SQL Server Permissions for Creating a New PI Repository Database

Instance Level		Database Level	
CREATE ANY DATABASE	Granted for: Creating SQL PI Database	db_owner	Granted for: Insert/delete PI records

NOTE: The “CREATE ANY DATABASE” permission can be removed after the SQL PI database is created. The SQL PI user should be the database owner of the new created SQL PI database.

Table 11. SQL Server Permissions for Using an Existing PI Repository Database

Instance Level		Database Level	
VIEW ANY DATABASE	Granted for: Select Existing Database	db_owner	Granted for: Insert/delete PI records

Permissions for monitored databases

Ensure that you set the permissions required, based on which database you are using:

- Permissions for Oracle databases
- Permissions for SQL Server databases
- Permissions for SAP ASE databases
- Permissions for DB2 for LUW databases
- Permissions for Azure SQL Database

Permissions for Oracle databases

If you are using Oracle®, ensure that these permissions are set.

Grant **Select** on the following dictionary views:

NOTE: For Oracle 12c and above, replace all the dba_* dictionary views with the cdb prefix (cdb_*)

Table 12. Oracle views requiring Select permission

Dictionary view	Dictionary view	Dictionary view
dba_constraints	gv_$session	v_$logfile
dba_data_files	gv_$session_wait	v_$open_cursor
dba_db_links	gv_$sort_segment	v_$osstat
dba_directories	gv_$spparameter	v_$parameter
dba_extents	gv_$sql	v_$pgastat
dba_free_space	gv_$sysstat	v_$pq_sysstat
dba_indexes	gv_$temp_extent_pool	v_$process
dba_jobs	gv_$undostat	v_$recovery_file_dest
dba_jobs_running	obj$	v_$resource
dba_libraries	recyclebin$	v_$result_cache_statistics
dba_objects	ts$	v_$rman_status
dba_profiles	uet$	v_$rowcache
dba_role_privs	user$	v_$segstat
dba_roles	v_$archive_dest	v_$segment_statistics
dba_rollback_segs	v_$archived_log	v_$sess_time_model
dba_scheduler_jobs	v_$asm_disk	v_$session
dba_scheduler_running_jobs	v_$asm_disk_stat	v_$session_wait
dba_segments	v_$asm_diskgroup	v_$sesstat
dba_sequences	v_$asm_diskgroup	v_$sga
dba_sequences	v_$asm_diskgroup_stat	v_$sga_dynamic_components
dba_synonyms	v_$asm_operation	v_$sgainfo
dba_sys_privs	v_$asm_template	v_$sgastat
dba_tab_columns	v_$cell	v_$spparameter
dba_tab_privs	v_$controlfile	v_$sql
dba_tables	v_$database	v_$sql_plan
dba_tablespaces	v_$datafile	v_$sqlarea
dba_temp_files	v_$dataguard_status	v_$sqltext_with_newlines
dba_temp_free_space	v_$dbfile	v_$standby_log
dba_undo_extents	v_$dispatcher	v_$statname
dba_users	v_$enqueue_stat	v_$sysmetric
dba_views	v_$enqueue_statistics	v_$sysstat
dba_recyclebin	v_$event_name	v_$system_event
fet$	v_$filestat	v_$system_parameter
file$	v_$fixed_table	v_$tablespace
gv_$archive_dest	v_$flash_recovery_area_usage	v_$temp_extent_pool
gv_$archived_log	v_$instance	v_$temp_space_header
gv_$instance	v_$instance_cache_transfer	v_$tempfile
gv_$instance_cache_transfer	v_$iostat_file	v_$tempstat
gv_$lock	v_$librarycache	v_$transaction

Table 12. Oracle views requiring Select permission

Dictionary view	Dictionary view	Dictionary view
gv_$pq_sysstat	v_$lock	v_$memory_target_advice
gv_$rman_configuration	v_$log	v_$pga_target_advice
gv_$rman_output	v_$log_history	v_$sga_target_advice
	v_$undostat	v_$sql_shared_cursor
gv_$archive_dest_status	v_$flashback_database_log	v_$backup_set_details
gv_$dataguard_stats	v_$dataguard_config	v_$session_event
gv_$dataguard_status		v_$services

Additional configurations for Amazon RDS for Oracle instances

There are two user credential options for monitoring Amazon RDS for Oracle instances:

- **Master predefined user** that comes as part of Amazon RDS for Oracle instance

  Or

- **Separate user** who has either of the following:
  - *SELECT_CATALOG_ROLE* or *SELECT ANY TABLE* system privilege
  - Grant additional permissions by manually executing the following commands from the master user:
    - ```
      EXEC
      RDSADMIN.RDSADMIN_UTIL.GRANT_SYS_OBJECT(p_obj_name=>'FET$',p_grante
      e =>'TEST', p_privilege => 'SELECT');
      ```
    - ```
      EXEC
      RDSADMIN.RDSADMIN_UTIL.GRANT_SYS_OBJECT(p_obj_name=>'UET$',p_grante
      e =>'TEST', p_privilege => 'SELECT');
      ```
    - ```
      EXEC
      RDSADMIN.RDSADMIN_UTIL.GRANT_SYS_OBJECT(p_obj_name=>'FILE$',p_grant
      ee =>'TEST', p_privilege => 'SELECT');
      ```
    - ```
      EXEC
      RDSADMIN.RDSADMIN_UTIL.GRANT_SYS_OBJECT(p_obj_name=>'OBJ$',p_grante
      e =>'TEST', p_privilege => 'SELECT');
      ```
    - ```
      EXEC
      RDSADMIN.RDSADMIN_UTIL.GRANT_SYS_OBJECT(p_obj_name=>'TS$',p_grantee
      =>'TEST', p_privilege => 'SELECT');
      ```
    - ```
      EXEC
      RDSADMIN.RDSADMIN_UTIL.GRANT_SYS_OBJECT(p_obj_name=>'USER$',p_grant
      ee =>'TEST', p_privilege => 'SELECT');
      ```
    - ```
      EXEC
      RDSADMIN.RDSADMIN_UTIL.GRANT_SYS_OBJECT(p_obj_name=>'RECYCLEBIN$',p
      _grantee =>'TEST', p_privilege => 'SELECT');
      ```

Permissions for SQL Server databases

If you are using SQL Server®, ensure that these permissions are set.
      ```

NOTE: Monitoring mirroring requires sysadmin privileges.

NOTE: A Foglight user needs to be created on every database within the instance, otherwise, it cannot be monitored. New databases created after the Foglight agent installation need to be added either by running the permission script again or manually using CREATE USER <Foglight User> under the new database.

Table 13. SQL Server Permissions

Instance Level		Database Level	
VIEW ANY DEFINITION	Granted for:	Map Foglight Login to a database user*	Granted for:
VIEW SERVER STATE	Tracing a Session	db_datareader	Running DBCC commands for indexes
ALTER TRACE	Deadlocks monitoring	db_ddladmin	
	PI Change-Tracking	CREATE USER**	

* Creation of a new user is not required if a domain group with the appropriate permissions is used.

** It's permission for Amazon RDS for SQL Server.

Grant **Execute** on these *master* database objects:

Table 14. Master database objects requiring Execute permission

xp_enumerrorlogs	Granted for Error log monitoring
xp_readerrorlog	

Grant **Select** on these *msdb* database objects:

Table 15. MSDB database objects requiring Select permission

log_shipping_monitor_primary	Granted for Log Shipping monitoring
log_shipping_monitor_secondary	
log_shipping_primaries	
log_shipping_secondaries	
log_shipping_primary_secondaries	
syscategories	
sysjobactivity	Granted for Jobs and Replication monitoring
sysjobs	
sysjobhistory	
dbm_monitor_data	Granted for Mirroring monitoring
dbm_monitor	
sysalerts	Granted for Agent alerts and services
agent_datetime	

NOTE:
1. For Amazon RDS for SQL Server, msdb database fixed database role of SQLAgentUserRole is needed.
2. For Amazon RDS for SQL Server, Master user should have access to all databases in the instance.

Permissions for SAP ASE databases

If using non-sa user, ensure the following:

- mon_role should be assigned to the user. sa_role should NOT be assigned.
- Procedures need to be manually created on the monitored instance. This is achieved by manually downloading and running the scripts *DB_Sybase_FirstRun_Scripts* located under *Foglight > Dashboards > Administration > Agents > Cartridges > Components for Download*. Refer to the *Foglight For SAP ASE Release Notes* for more details.

Permissions for DB2 for LUW databases

If you are using DB2 LUW, ensure that these permissions are set.

Set Account **Privileges** on:

- SYSMON authority

Grant **Select privilege** on:

- SYSCAT.COLUMNS
- SYSCAT.ROUTINES
- SYSCAT.VIEWS
- SYSIBMADM.PRIVILEGES
- SYSIBMADM.SNAPADM
- SYSIBM.SYSDUMMY1
- SYSIBM.SYSPLAN

Grant **Execute** on:

- AUTH_LIST_AUTHORITIES_FOR_AUTHID

Required Monitor Switches

Table 16. Required Configurations

Monitor switches for version 9.5 to 9.7	Monitoring parameters for version 9.7.0.5 or above*
UOW	MON_REQ_METRICS
STATEMENT	MON_ACT_METRICS
LOCK	MON_OBJ_METRICS
SORT	
TABLE	
BUFFERPOOL	
TIMESTAMP	

*Should be set to at least the base level.

Permissions

Table 17. Permissions — All versions

General
ADMIN_CMD
ENV_GET_PROD_INFO
DB_PARTITIONS
ENV_GET_SYS_INFO
SNAP_GET_APPL_INFO
SNAP_GET_BP
SNAP_GET_APPL
SNAP_GET_BP_PART
SNAP_GET_DBM
SNAP_GET_HADR
SNAP_GET_DBM_MEMORY_POOL
SNAP_GET_FCM_PART
SNAP_GET_STMT
SNAP_GET_LOCKWAIT
SNAP_GET_SWITCHES
SNAP_GET_STORAGE_PATHS
PD_GET_DIAG_HIST

Table 18. Permissions — Version-specific

9.5	9.7.0.5	10.1
SNAP_GET_DB_V91	ENV_GET_SYSTEM_RESOURCES	ENV_GET_SYSTEM_RESOURCES
SNAP_GET_TAB_V91	MON_GET_PKG_CACHE_STMT	MON_GET_PKG_CACHE_STMT
SNAP_GET_TBSP_V91	MON_FORMAT_LOCK_NAME	MON_FORMAT_LOCK_NAME
SNAP_GET_CONTAINER_V91	WLM_GET_SERVICE_CLASS_AGENTS_V97	WLM_GET_SERVICE_CLASS_AGENTS
SNAP_GET_DYN_SQL_V91	MON_GET_WORKLOAD	MON_GET_WORKLOAD
	MON_GET_TABLESPACE	MON_GET_TABLESPACE
	ENV_GET_DB2_SYSTEM_RESOURCES	ENV_GET_DB2_SYSTEM_RESOURCES
	ON_GET_SERVICE_SUBCLASS_DETAILS	MON_GET_SERVICE_SUBCLASS_DETAILS
	MON_FORMAT_XML_TIMES_BY_ROW	MON_FORMAT_XML_TIMES_BY_ROW
	MON_GET_UNIT_OF_WORK	MON_GET_UNIT_OF_WORK
	MON_GET_BUFFERPOOL	MON_GET_BUFFERPOOL
	MON_GET_TABLE	MON_GET_TABLE
	MON_GET_CONTAINER	MON_GET_CONTAINER
	MON_GET_FCM_CONNECTION_LIST	MON_GET_FCM_CONNECTION_LIST
	MON_GET_CONNECTION	MON_GET_CONNECTION
		MON_GET_MEMORY_POOL
		MON_GET_MEMORY_SET

Table 18. Permissions — Version-specific

9.5	9.7.0.5	10.1
	SNAP_GET_TBSP_V91	SNAP_GET_TBSP
	SNAP_GET_DB_V91	MON_GET_TRANSACTION_LOG
		SNAP_GET_DB
		DB2_GET_INSTANCE_INFO
		ADMIN_GET_STORAGE_PATHS

Table 19. Permissions - 10.5 and later

10.5 and later
ENV_GET_SYSTEM_RESOURCES
MON_GET_INSTANCE
MON_FORMAT_LOCK_NAME
MON_GET_PKG_CACHE_STMT
MON_GET_AGENT
MON_GET_WORKLOAD
ENV_GET_DB2_SYSTEM_RESOURCES
MON_GET_DATABASE
ADMIN_GET_STORAGE_PATHS
DB2_GET_INSTANCE_INFO
MON_GET_TRANSACTION_LOG
MON_GET_CONNECTION
MON_GET_FCM_CONNECTION_LIST
MON_GET_CONTAINER
MON_GET_TABLE
MON_GET_BUFFERPOOL
MON_GET_UNIT_OF_WORK
MON_FORMAT_XML_TIMES_BY_ROW
MON_GET_SERVICE_SUBCLASS_DETAILS
MON_GET_TABLESPACE
MON_GET_MEMORY_POOL
MON_GET_MEMORY_SET

Grant **Select** on these SYSIBMADM administrative views:

- DBPATHS*
- REG_VARIABLES
- BP_HITRATIO
- DBCFG
- MON_LOCKWAITS*
- SNAPDBM
- SNAPFCM
- SYSIBMADM.ENV_PROD_INFO

* For DB2 version 9.7.0.5 or later

PureScale environments

Grant **Execute on** to these table functions:

- MON_GET_CF
- MON_GET_GROUP_BUFFERPOOL
- BP_HITRATIO

Grant **Select** on these views:

- ENV_CF_SYS_RESOURCES
- SNAPDB
- SYSIBMADM.DB2_MEMBER

Permissions for Azure SQL Database

Foglight for Azure SQL can be used for granting permissions on several levels.

The following sections detail the permissions that can be granted to users of Azure SQL at each level, and instruct how to manually run the grant privileges script.

Granting Permissions to Azure SQL Users

Database-level Permissions

The following permissions are granted at the database level:

- CREATE USER—the lowest permission level, which only allows accessing each database for reading its metadata.

  IMPORTANT: The CREATE USER permission does not come as part of the script, as the command is not supported as part of a batch in Azure SQL.

- VIEW DATABASE STATE—required by all tiers (General Purpose, Hyperscale, and Business Critical) on the vCore model.

  IMPORTANT:

  On the DTU model:

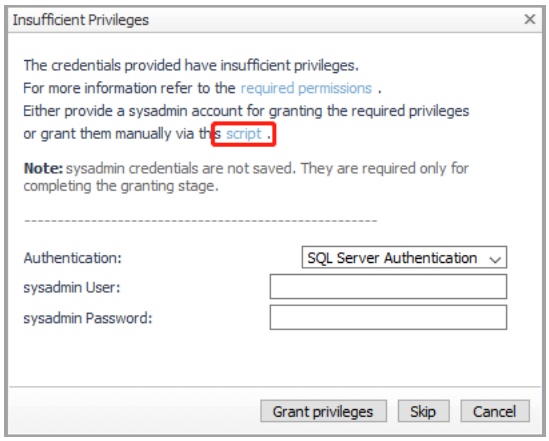
  - Basic, Standard 0, and Standard 1 tiers require **server admin** permission or an Azure Active Directory admin account (**VIEW SERVER STATE** permission).
  - Standard 2 and above tiers as well as Premium tiers require **VIEW DATABASE STATE** permission.

Running the Grant Permissions Script

The file used for granting permissions manually, *SQLAzureGrantPrivilegesScript.sql,* can be downloaded by clicking the link View script under the Instances table, accessible via either of the following methods:

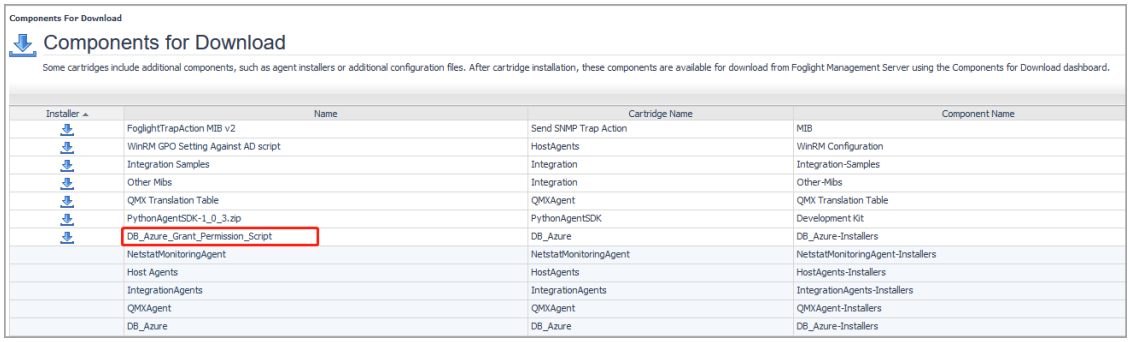
- When running the Monitor Azure SQL Database wizard, the script link is in the *Insufficient Privileges* dialog screen.

Figure 2. Insufficient Privileges dialog



- In the Cartridges - *Components for Download* screen.

Figure 3. Components for Download



> **IMPORTANT:** Running this file requires one of the following server roles:
> - Server admin
> - Active Directory admin
> - Member of the db_owner

To manually run the Grant Permissions script:

1. Run the CREATE USER command on a database to be monitored.

   Upon successful completion of this command, the login becomes a user in the specific database, and therefore able to read the database's metadata.
2. Open the *DBSS_Azure_Permissions_User_Databases.sql* file in SQL Server Management Studio (SSMS).
3. Find the *Select @LoginName = ?* section at the beginning of this file.
4. Replace the question mark with the login name to which the requested permissions are to be assigned.
5. Execute the script.

Permissions for monitored operating systems

For details, see the following topics:

- General Unix requirements
- VMware permissions
- Windows permissions

General Unix requirements

The OS user account for each agent requires:

- Silent log-in — in particular, there must be no user-input required and no special login banners displayed
- For connections using SSH, the sshd daemon must be installed and running.

In addition to these general UNIX® system requirements, each agent user account requires additional privileges depending on the operating system, as specified in the following table.

NOTE: When monitoring DB2, SYSMON role and privileges for OS user is not required but is recommended to allow the installation to provide more information when discovering DB2 databases.

Linux/UNIX permissions

Table 20. Linux/UNIX Permissions

Permission	Linux®	Solaris®	AIX®	HP-UX
Execute	awk	awk	awk	awk
	df	db2ptree	df	bdf
	free	df	head	bindprocessor
	getconf	head	hostname	getconf
	head	hostname	iostat	head
	hostname	iostat	lsattr	hostname
	iostat	lsnrctl	lsdev	ioscan
	lsnrctl	mpstat	lsnrctl	iostat
	netstat	uptime	netstat	lsattr
	ps	netstat	oslevel	lsdev
	sed	pagesize	pagesize	lsnrctl
	tail	ps	ps	netstat
	sysstat	psrinfo	tail	oslevel
	uname	tail	uname	pagesize
	uptime	uname	uptime	ps
	vmstat	vmstat	vmstat	sar
	/proc/	/usr/sbin/prtconf		tail
				uname
				uptime
				vmstat
				/usr/sbin/

Table 20. Linux/UNIX Permissions

Permission	Linux®	Solaris®	AIX®	HP-UX
Read	cpuinfo free* getconf sysstat package* /proc /proc/cpuinfo* /proc/net/dev /proc/stat /proc/vmstat on Linux >= 2.6			/var/adm/syslog/syslog.log

VMware permissions

To monitor VMware®, users must have **read only** access to the virtual center.

Windows permissions

Foglight support monitoring Windows® operating system in one of two ways: WinRM and WMI. The preferred method is WinRM when no WinRM connection WMI connection is used.

WinRM (default) - Based on Kerberos authentication or Basic authentication uses standard HTTP headers. For more information, see http://support.quest.com/technical-documents/foglight-agent-manager/6.0.0/foglight-agent-manager-guide/advanced-system-configuration-and-troubleshooting/configuring-windows-remote-management-winrm.

WMI (fallback) — Permission to access both DCOM and WMI. For more information, see

http://support.quest.com/technical-documents/foglight-agent-manager/6.0.0foglight-agent-manager-guide/advanced-system-configuration-and-troubleshooting/configuring-windows-management-instrumentation-wmi.

2

Install the DB cartridge and DB agent

This section includes details about the following topics:

- Install the DB cartridge
- Install a single DB agent

Install the DB cartridge

Foglight for database cartridges run on the Foglight Management Server, which is the operation framework. Therefore, Foglight Management Server must be installed before installing a database cartridge.

To install the Foglight for <database> cartridge:

1. Copy the cartridge car file included in the installation media to your local computer. This file is named as follows:
   - For Foglight for DB2 LUW: DB_DB2-6_0_0.car
   - For Foglight for Oracle: DB_Oracle-6_0_0.car
   - For Foglight for SQL Server: DB_SQL_Server-6_0_0.car
   - For Foglight for Azure SQL Database: DB_Azure-6_0_0.car
2. Log in to the Foglight browser interface.
3. On the navigation panel, click **Dashboards > Administration > Cartridges > Cartridge Inventory**.
4. On the Cartridge Inventory dashboard, click **Install Cartridge** to find the CAR file on your local computer.
5. Click **Install Cartridge**.

Install a single DB agent

For details, see the following topics:

- Install a single SQL Server or Oracle agent
- Install a single DB2 agent
- Install a single SAP ASE agent
- Install an Azure SQL DB agent

Install a single SQL Server or Oracle agent

To install a single SQL Server or Oracle agent:

1. On the Foglight navigation panel, click **Homes > Databases**.
2. Click **Monitor > <DB type>** in the lower left corner of the Databases View.

   The Monitor Instance dialog box appears.
3. Choose the agent manager on which the agent is running. The default is the agent manager with the least agents installed.
4. On the Monitor Instance pane, provide connection details.
5. Select an Alarm Sensitivity Level to determine what level of alarms the system stores and displays for this instance.
6. Optional SQL PI- In the Monitoring Extensions pane, click the SQL PI monitoring extension. You are prompted to choose the Agent Manager on which the SQL PI repository is installed.
7. **Optional OS**. In the Monitoring Extensions pane, click the **Operating System** link. To configure the extension, choose the connection details of the host on which the SQL Server instance is running.
8. **Optional VM**. In the Monitoring Extensions pane, click **Collect VM** statistics. To configure the extension, select the connection details of the vCenter® or ESX® on which the SQL Server instance is running.
9. Click **Monitor**.

Install a single DB2 agent

To install a DB2 agent:

1. On the Foglight navigation panel, click **Homes > Databases**.
2. Click **Monitor > DB2** in the lower left corner of the Databases View.

   The Monitor Instance dialog box appears.
3. Follow the prompts to configure an agent to monitor the DB2 host, instance, and databases. For help with options, click the **'i'** icon.

IMPORTANT:
1. When DB2 authentication type is CLIENT, the login credentials provided during installing for the database agent are overwritten with the fglAM user. Ensure that the fglAM user can connect to the DB2 instance and has all the relevant permissions as described in the Permissions section.
2. When trying to connect to DB2 instance with SSL, import SSL certificate into FglAM first. Go to directory `<FglAM_HOME>/agents/DB_DB2/<DB2_version>-<DB2_version>-<BUILD_ID>/lib/`, run command `certificate-<DB2_version>-ksh.ksh(certificate-<DB2_version>-bat.bat)`

Install a single SAP ASE agent

After installing the cartridge, update the SAP ASE account for Foglight by manually downloading and running the scripts `DB_Sybase_FirstRun_Scripts` located under *Foglight* > *Dashboards* > *Administration* > *Agents* > *Cartridges* > *Components for Download*.

1. Run script `rapsAdmin.sql` as **sa** user. This script creates only two helper stored procedures:
   - `sp_fgl_addgrant and sp_fgl_adduser`
   - `isql -Usa -Ppassword -SserverName -i rapsAdmin.sql -o rapsAdmin.out`

2 Run these scripts to complete the upgrade and to display the correct information on the new dashboards. For script execution instructions, see “Configuring SAP ASE Login Privileges” in the *Foglight for SAP ASE User and Reference Guide*. Failed to upgrade the user account will result in broken agent instances.

3 Once you have installed the cartridge, deploy the agent package. For complete information, see “Deploying agent packages to monitored hosts” in the *Foglight Administration and Configuration Help*. After upgrading the cartridge and starting the agent, the Agent log will display the database version, cartridge version, EBF level, and so on.

- When you start using a new SAP ASE user or when the SAP ASE cartridge is upgraded with a new version, the stored procedures will be automatically reinstalled.
- For monitoring Replication Server (RS) instance, you need to configure the path to the sql.ini file in the ASP with all the servers participating in the RS Agent. You can take the sql.ini file which exists in the Replication Server as an example.
- When creating a new agent, it is recommended to clone all the default lists to new lists which will be used only for this agent – in the same way you did with the legacy cartridge.

Post Installation Instructions

After installing the Cartridge for SAP ASE, perform the configuration steps below:

To create a new SAP ASE user, run the following scripts as sa user (use your username and password).

```
exec sp_addlogin 'username' , 'password' , sybsystemprocs
exec sp_fgl_adduser 'username' , 'foglightGroup'
```

Grant mon_role to 'username'

NOTE: The new user should have only one role: *mon_role*.

Install an Azure SQL DB agent

To install an Azure SQL DB agent:

1 On the Foglight navigation panel, click **Homes > Databases**.

2 Click **Monitor > Azure SQL** in the lower left corner of the Databases View.

The *Monitor Azure SQL Database* dialog box appears.

3 Follow the prompts to configure an agent to monitor the Azure SQL host, instance, and databases. For help with options, click the **'i'** icon.

3

Special configurations

This section documents the product settings required for special configurations:

- Foglight Upgrades
- High Availability
- Federation
- Concentrator (Proxy)

Foglight Upgrades

If your environment has either of the following deployments, contact your Account Manager or Quest Support prior to performing the Foglight Management Server upgrade:

- More than 50 monitored instances
- Federation
- High Availability (HA)

High Availability

The *Foglight High Availability Field Guide* is available online at:

http://support.quest.com/technical-documents/foglight/6.0.0/high-availability-field-guide/

NOTE: HA is not supported for:

- SAP ASE and RS Agents

Federation

The Foglight Federation Field Guide is available online at:

http://support.quest.com/technical-documents/foglight/6.0.0/federation-field-guide/

Concentrator (Proxy)

Information is available online:

- **Agent Manager** - http://support.quest.com/technical-documents/foglight-agent-manager/6.0.0/foglight-agent-manager-guide/configuring-the-agent-manager/configuring-an-agent-manager-instance-as-a-concentrator

- **DB agent** - Step by step configuration is provided in the “Configuring the On Demand Port on the Agent Manager Concentrator” section in the *Foglight for Oracle User and Reference Guide* and in the *Foglight for SQL Server User and Reference Guide*.

NOTE: Not supported for SAP agents.

Table 21. Concentrator Agent Manager

Number of Agents	<100	<200
JVM Settings*	2048MB	4096MB
CPUs (2.4GHz)*	2 cores	4 cores
RAM*	4GB	6GB

CPUs (2.4GHz)*- for a virtual machine the CPU reservation is highly recommended for better performance. The reservation is expressed in MHz.

RAM*- for a virtual machine the memory reservation is highly recommended for better performance.

JVM Settings*- After locating your hardware requirements in the tables, ensure that you complete the manual JVM Setting configuration as described in Manual configuration requirement for SQL PI Repository.

About us

Quest creates software solutions that make the benefits of new technology real in an increasingly complex IT landscape. From database and systems management, to Active Directory and Office 365 management, and cyber security resilience, Quest helps customers solve their next IT challenge now. Around the globe, more than 130,000 companies and 95% of the Fortune 500 count on Quest to deliver proactive management and monitoring for the next enterprise initiative, find the next solution for complex Microsoft challenges and stay ahead of the next threat. Quest Software. Where next meets now. For more information, visit https://www.quest.com/.

Technical support resources

Technical support is available to Quest customers with a valid maintenance contract and customers who have trial versions. You can access the Quest Support Portal at https://support.quest.com.

The Support Portal provides self-help tools you can use to solve problems quickly and independently, 24 hours a day, 365 days a year. The Support Portal enables you to:

- Submit and manage a Service Request.
- View Knowledge Base articles.
- Sign up for product notifications.
- Download software and technical documentation.
- View how-to-videos.
- Engage in community discussions.
- Chat with support engineers online.
- View services to assist you with your product