



HDR UK Gateway Query Portal and Connector - TECHNICAL DOCUMENTATION

This document is referenced in the Implementation Document, Infrastructure Implementation Steps Section I2.

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HDR UK Gateway - Solution overview

Executive Summary

The HDR UK Gateway application suite facilitates performing data availability queries in federated environment e.g. finding out how many patients with an Asthma diagnosis are within each Data Partner's datasets.

In technical terms, system has two main components: BC|RQUEST server (Query portal) running in an Azure environment where registered users can launch queries and BC|LINK (Connector) servers installed inside the Data Partner's firewall. The Connector polls tasks from query portal server, executes queries and sends results (i.e. patient counts (rounded to next full ten).

The Connector server is managed by the Data Partners infrastructure team or partner and should be subject to their local server maintenance and security procedures (OS updates and server maintenance tasks / logging etc). Trusted employees within the Data Partners' team may require

access to copy data files to the server (e.g. SFTP or SCP). The Connector requires an single outbound SSH connection to the query portal server for receive and fetch tasks (fixed IP address).

Query portal application

The query portal is a modern technology-enabled service platform that brings together Data Partners and researchers. The service provides data discovery users (research teams) with tools to browse and analyse summary level information from Data Partners. It presents users with an aggregate summary of query results on a per collection basis. By informing users about the availability of samples and data it enables them to identify which Data Partners may hold the resources that best meet the users research needs. The service also gives both sides communication tools needed to collaborate by standardising the way that users request data and samples from Data Partners (subject to the Data Partners standard governance procedures).

Main features of the query portal include:

- Facilitating researchers to find Data Partners with suitable data to collaborate with in R&D projects and clinical trials (via availability queries)
- Performing research-related data analysis combining clinical and genome data (via meta-analyses), without compromising patient privacy
- Integrating multiple Data Partner datasets simultaneously whilst adhering to applicable data privacy, data security and data usage rights

Availability queries and meta-analysis functionality

Using availability queries, researchers can search Data Partner datasets for patients that fulfil certain sought-after criteria. Such availability information is typically relevant for planning clinical trials (feasibility studies) or identifying suitable subjects for research projects. Availability queries can be complex and contain different criteria including clinical and genomics-related parameters, as well as a time element. Availability queries return a subject count filling the defined search criteria. Subject counts are only returned if more than five subjects match the search criteria, although this number is configurable to meet the Data Partner's requirements. No other data is returned from data repositories.

Meta-analyses are a branch of statistical analytics. These are based on aggregate data, and do not require access to individual subject level data. This technique is widely used in collaborative research projects to ensure compliance when performing research on data originating from multiple sources.

Using the HDR UK Gateway, researchers generate aggregate-based meta-analysis queries, which the Connector modules at specified Data Partners fetch and process. Connector responses contain only aggregate data to answer a given availability query or meta-analysis. This aggregate data consists of, for example, subject counts and statistical parameters (such as means, frequencies, standard deviations, hazard ratios, p-values, confidence limits, normalised data pairs, neural network weights etc). The aggregate functions are limited in the Connector to return results only if more than five subjects match the query criteria by default. If required, the small number suppression figure can be changed to fit the requirements of the Data Partner.

The Connector application

The Connector is a software module to hold the anonymised data, and to serve queries sent through the query portal. The Connector module resides within Data Partner's IT environment, where it is maintained by the Data Partner's IT personnel, and/or the CO-CONNECT infrastructure team. Data Partner staff have access to the server for copying anonymised data into the Connector for further anonymisation (i.e. removal of keys between Data Partner's anonymised data and Connector-hosted content).

The Connector consists of a database with a strict data model, which holds the cohort data. The module contains a response engine (client application), which fetches data queries from the query portal. These queries are run within the Connector module, using the data in the database. Once completed, the Connector sends a response to each query either as the number of individuals or summary statistics. The Connector responses do not contain data about the individual data entries in the cohorts included in the query.

Network access restrictions

The Connector server containing anonymised data is installed behind the Data Partner's firewall. The Connector server provides IP-address-restricted encrypted network access for three purposes only (shown in Table 1):

1. Query polling and responses to bcrquest.com web server(s)
2. Server maintenance access (such as SSH or VPN)
3. Access for anonymised data updates by Data Partner staff.

All other ports in and out are blocked and no unencrypted connections are allowed.

Description	Access point
Encrypted service access from CO-CONNECT Infrastructure Team to the Connector for installation and maintenance	Dedicated maintenance IP address CO-CONNECT's secure Azure environment, may also utilise VPN
Data Partner personnel copying anonymised data to Connector server	From Data Partner's internal network, may also utilise VPN
Connector connection to the query portal server for polling new queries, and for sending aggregate statistics data to bcrquest.com	From Connector to query portal server

Table 1. Open network access points to the Connector server.

Other security considerations

Data intended for the Connector module must conform to local law concerning individual anonymity and confidentiality, requirements in individual consents to allow data to be used in research, and other relevant law and regulations. The Data Partner has the ownership of data in the Connector.

In case of a data breach, follow up actions can include suspension of accounts, temporal isolation of the Connector from the query portal, or all other activities that allow CO-CONNECT and Data Partner staff to minimize the perceived security threat.

Both components of the HDR UK Gateway, and the enabling network communications technology adheres to CO-CONNECT's security requirements for software development and system architecture.

Limitations in data analysis

Services based on analysis of aggregate data have their mathematically introduced limitations to accuracy and specificity of the results. De-identification process of data introduces randomisation and intended inaccuracy. However, the process always adheres to limits that aim to preserve the correct statistical distribution of an attribute within the cohort, which then allows meaningful use of cohort data in summary statistics.

As Data Partners' data originates from health data collections, the correctness of the data is the responsibility of the collecting Data Partner. CO-CONNECT does not have technical or legal ability to address inaccuracies in data. The users of the query portal are made aware of this limitation, and the

unsuitability of the service in replacing or replicating any clinical trials done with original patient health data and samples.

Query portal users are forbidden to attempt to identify a person or persons within the service, engage in unethical research practices, or pursue research goals which would not meet the approval of an ethical review board supervising either research projects or publication of results.

Connector - technical details

Firewall configuration requirements

The Connector needs the following connections open in the firewall:

- Egress to query portal IP address
 - Port 22 (SSH) - for fetching tasks
 - Port 80 (HTTP) – for installation and updating (temporary for initial installation and updates)
 - Port 443 (HTTPS) - for installation and updating (temporary for initial installation and updates)
- Ingress from CO-CONNECT (optional, temporary/ad-hoc access only)
 - Port 22 (SSH) - for system maintenance

Connector technical stack

The Connector consists of the following technical components:

- Operating system: CentOS 7 (latest)
- Database: PostgreSQL 11
- HTTP-server: Apache 2.4.6-97
- Application server: Apache Tomcat/8.5.61

Full list of the RPM packages available in the chapter [List of RPMs installed on the Connector machine](#).

How to install the Connector

- Create and configure the Connector VM
 - Capacity: at least 16 GB RAM, 4 vCPU 500GB Storage
 - OS: latest CentOS 7
 - Check VM network is enabled
 - Check that the VM hostname doesn't conflict with that of the query portal. For this phase of deployment, the test instance of the query portal is: `cconnect-test-cent7-ip.northeurope.cloudapp.azure.com` – you can compare this with the

hostname of your Connector by running the following command on the Connector machine:

```
hostname
```

-
- Provided with this document is:
 - *bc-ansible-link.zip* installation package
- Extract and install
 - Login to the Connector VM as root
 - Copy *bc-ansible-link.zip* installation package onto the VM
 - Extract:

```
unzip bc-ansible-link.zip
```

- Follow the instructions in the `/bc-ansible-link/README.md` file.
- These are the commands to install ansible and run the playbook:

```
● yum -y install epel-release && yum -y install ansible
● cd bc-ansible-link/
● ansible-playbook -v ./playbooks/bc-link-vm.yml -e
  host=localhost \
●   -e user=ansible \
●   -e download_username=bclink-6-0-0 \
●   -e download_password=S3kV.6ZvFmu \
●   -e new_user_id=data \
●   -e new_user_password=<set a strong password as per
  your policies. This is for the Connector GUI login> \
●   -e bc_insight_db_user_password=<set a strong
  password as per your policies. This is for the
  Connector's postgres database>\
●   -e pg_ssl_server_hostname=<your Connector machine
  hostname> \
●   -e bc_insight_release=6.0.0-rc21 \
●   -e rquest_host=65.52.72.119 \
●   -e
  rquest_hostkey=AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbml
  lzdHAyNTYAAABBLUAcOQ4UvFAD9u6c7fYcwCldQzUYblFRp+WEHL
  QdUFot9LuwuzWglvAdSqv0ud4PJ4xeqZjHPJT9YYm/URWA= \
●   -e biobank_name=<this parameter, also referred to
  as collection acronym, will be provided by CO-
  CONNECT> \
-e rquest_coding_system=OMOP
```

- Ansible variables:
 - **user:** user account that will execute the installation on the target server
 - **download_username:** username to BC Platforms private yum repository
 - **download_password:** username to BC Platforms private yum repository

- **new_user_id**: username to be used to log into Connector GUI
 - **new_user_password**: password to be used to log into Connector GUI - Should be alphanumeric and not contain special characters
 - **bc_insight_db_user_password**: PostgreSQL password - Should be alphanumeric and not contain special characters
 - **pg_ssl_server_hostname**: PostgreSQL hostname
 - **bc_insight_release**: version of the Connector to be installed
 - **rquest_host**: IP address of the query portal machine
 - **rquest_hostkey**: SSH host key of the query portal machine
 - **biobank_name**: collection acronym to be provided by CO-CONNECT
 - **rquest_coding_system**: data model to be used in the Connector database
- Verify that everything works by opening this in a web browser from a machine that can access the Connector: <https://<Connector gui hostname or IP address>/bcapp/>

How to update the Connector

Routine updates will take place periodically, at a cadence agreed with the Data Partner. Ad hoc patching may be required in the case of security updates. The CO-CONNECT infrastructure team will notify Data Partners if and when this is necessary with the updates to be applied when agreed with the Data Partner.

Run as root:

```
yum update
systemctl restart gened.service
systemctl restart tomcat8.service
systemctl restart dovecot.service
systemctl restart httpd.service
```

How to modify Connector configuration

N.b. this is for changing the configuration, which should only be done when advised by the CO-CONNECT infrastructure team. For example, this might be necessary if moving the Connector from a test to a staging or production environment.

1. Edit configurations in file `/etc/bcos.d/02_bclink_config.sh`

- `BIOBANK_NAME` = collection acronym
- `BCLINK_DATABASE` = name of database containing Connector data
- `BCLINK_REMOTE_HOST` = name or IP address of portal machine

- BCLINK_REMOTE_HOSTKEY = host key of portal machine, needed for securely establishing SSH tunnel without risk of Man-in-the-Middle -attack
- BCLINK_CODING_SYSTEMS = comma-separated list of coding systems used in records data (e.g., OMOP)

2. Apply changes

- run as root: `bcos-reconfigure.sh`
 - this may take several minutes
 - produces error and warning messages related to deprecated forms, no need to worry about them
- restart services
 - if the portal server IP address or name or hostkey were changed, restart the ssh tunnel service:
`systemctl restart bclink-autossh`
 - if collection ID or database name was modified, restart all clients:
`systemctl restart bclink-client@rquest_client1`
`systemctl restart bclink-client@rquest_client2`
`systemctl restart bclink-client@rquest_client3`
`systemctl restart bclink-client@rquest_client4`
`systemctl restart bclink-client@rquest_client_heavy1`
`systemctl restart bclink-client@rquest_client_heavy2`
- if coding system was changed, the change must be manually applied to `/etc/bcos/registry/default.reg`
 - copy new value to line with key 'rquest.coding_system'

How to install OMOP data model

Scripts for OMOP data model installations are available via `bc-wget`. Make a directory for OMOP files under `/usr/lib/bcos/OMOP`.

Run:

```
sudo su bcos_srv
mkdir /usr/lib/bcos/OMOP
cd /usr/lib/bcos/OMOP
bc-wget OMOP/install_full_omop.sh
bc-wget OMOP/create_omop_cdm.sh
bc-wget OMOP/create_index_cdm.sh
chmod +x *.sh
```

- `install_full_omop.sh` installs the forms and data with `bc-wget` for vocabulary tables and populates the tables into the database
- `create_omop_cdm.sh` installs the forms and creates tables in the database
- `create_index_cdm.sh` creates indexes for the OMOP tables in the database

Run the scripts as `bcos_srv`:

```
./create_omop_cdm.sh <database userid> <database>
./install_full_omop.sh <database userid> <database>
./create_index_cdm.sh <database userid> <database>
```

e.g. if the Connector is configured using the default options, the commands would look like:

```
./create_omop_cdm.sh data bclink
./install_full_omop.sh data bclink
./create_index_cdm.sh data bclink
```

As root, edit the BC|LINK registry file for the OMOP data model. This registry file can be found at `/etc/bcos/registry/<database_name>.reg`, which is by default `/etc/bcos/registry/bclink.reg`.

The following configuration has to be added after “`# bc-link-config end`” comment line in order to persist over reboots:

```
rquest.omop yes
rquest.omop_person <person table id>
rquest.omop_condition <condition table id>
rquest.omop_observation <observation table id>
rquest.omop_measurement <measurement table id>
rquest.omop_procedure <procedure table id>
rquest.omop_medication <medication table id>
rquest.omop_death <death table id>
rquest.concept <concept table id>
rquest.relationship <relationship table id>
rquest.omop_subsumes yes
```

Example configuration: Edit as root

```
$ cat /etc/bcos/registry/bclink.reg
# bc-link-config start

# (you can delete the default configuration between these tags)

# bc-link-config end
```

```
# (add your own configuration after this tag)

rquest.omop yes
rquest.omop_subsumes yes
rquest.omop_observation observation
rquest.omop_measurement measurement
rquest.omop_condition condition_occurrence
rquest.omop_person person
rquest.omop_procedure procedure_occurrence
rquest.omop_medication drug_exposure
rquest.search_all_omop yes
rquest.concept concept
rquest.relationship concept_relationship
```

Connector to query portal connection

Ensure the Connector IP address has been allowed through the firewall via port 22 of the query portal machine by the CO-CONNECT infrastructure team

Ensure the public ssh key of the bcos_srv user on the Connector machine, (/data/usr/lib/bcos/.ssh/id_rsa.pub) has been sent to CO-CONNECT and the team will add it to the portal machine nologin user STD_TUNNEL's authorized keys file to enable ssh authentication.

List of RPM packages maintained by BC Platforms

This is a list of all RPM packages maintained by BC Platforms:

BC RPM package	Description
bc-basic-queue-apps-6.0.0.rc21-10.x86_64	Applications that run in the job queue, collect results etc.
bc-basic-queue-db-apps-6.0.0.rc21-10.x86_64	Applications that run in the job queue and might have access to the database or remote filesystem.
bc-bcapp-tomcat-war-6.0.0.rc21-24.x86_64	Configurations for Tomcat (Java application server).
bc-bcos-srv-6.0.0.rc21-10.x86_64	Configuration of bcos_srv service account used to execute services.
bc-csrf-6.0.0.rc21-10.x86_64	Tools for CSRF (Cross-Site Request Forgery) protection in CGI pages.
bc-db-postgresql-6.0.0.rc21-10.x86_64	PostgreSQL Java libraries.
bc-insight-initial-pg-database-6.0.0.rc21-10.x86_64	PostgreSQL initialization scripts.
bc-insight-tools-6.0.0.rc21-10.x86_64	Configuration files for accessing BC INSIGHT/BC LINK data warehouse.
bc-liquibase-6.0.0.rc21-10.x86_64	Liquibase data versioning tools.
bc-mod-python-6.0.0.rc21-10.x86_64	Apache OAuth2 module.
bc-opt-bcplatforms-files-6.0.0.rc21-11.x86_64	BC opt script package.
bc-pdfgen-6.0.0.rc21-10.x86_64	PDF helper library.
bc-postgresql-driver-6.0.0.rc21-10.x86_64	Postgres driver.
bc-rest-security-6.0.0.rc21-10.x86_64	REST API access management scripts.
bc-rsyslog-virtual-machine-6.0.0.rc21-10.x86_64	Rsyslog helper scripts.
bc-tomcat-war-api-6.0.0.rc21-10.x86_64	REST API for accessing datasets etc.
bc-tomcat-war-bcadmin-6.0.0.rc21-10.x86_64	BCAdmin module for managing users and logs.
bc-tomcat-war-bcadmin-utils-6.0.0.rc21-10.x86_64	BCAdmin helper scripts.
bcfs-java-all-6.0.0.rc21-10.x86_64	BCFS - virtual file system module.
bclink2rquest-autossh-6.0.0.rc21-10.x86_64	BC LINK to BC RQUEST SSH connection tools.
bcos-appserver-conversions-6.0.0.rc21-10.x86_64	Data conversion library.

bcos-appserver-files-6.0.0.rc21-10.x86_64	Helper tools to manage the data warehouse.
bcos-appserver-files-newgui-6.0.0.rc21-10.x86_64	Package of updated helper tools to manage the data warehouse.
bcos-appserver-files-www-6.0.0.rc21-10.x86_64	Apache WWW files.
bcos-appserver-files-www-base-6.0.0.rc21-10.x86_64	Static html files, logo images, js libraries etc.
bcos-appserver-files-www-gui-6.0.0.rc21-10.x86_64	Static html files, logo images, js libraries etc.
bcos-appserver-files-www-manuals-6.0.0.rc21-10.x86_64	Web files for user manual.
bcos-appserver-files-www-manuals-html-6.0.0.rc21-10.x86_64	Web files for user manual.
bcos-appserver-files-www-rabbitmq-6.0.0.rc21-10.x86_64	RabbitMQ module - to be deprecated.
bcos-appserver-files-www-templates-6.0.0.rc21-10.x86_64	WWW template files.
bcos-appserver-files-www-templates-common-6.0.0.rc21-10.x86_64	WWW template files.
bcos-appserver-files-www-wwwcgi-6.0.0.rc21-10.x86_64	WWW CGI binaries.
bcos-appserver-files-www-wwwcgi-bin-6.0.0.rc21-10.x86_64	WWW CGI binaries.
bcos-appserver-gui-pictures-6.0.0.rc21-10.x86_64	Static graphical components for Web pages.
bcos-bc-files-6.0.0.rc21-10.x86_64	Helper tools for BC command line.
bcos-bc-kube-hand-fixes-6.0.0.rc21-10.x86_64	BC INSIGHT / BC LINK post installation scripts.
bcos-etc-config-6.0.0.rc21-10.x86_64	Installation specific configuration files.
bcos-ext-linux-plink-6.0.0.rc21-10.x86_64	PLINK GWAS tools.
bcos-httpd-bcos-cfg-6.0.0.rc21-10.x86_64	Apache HTTP server configurations - mapping URL paths to services.
bcos-httpd-dovecot-6.0.0.rc21-10.x86_64	Dovecot setup and configuration.
bcos-httpd-ssl-6.0.0.rc21-10.x86_64	SSL setup script.
bcos-illumina-conversions-6.0.0.rc21-10.x86_64	Illumina data format converters.
bcos-insight-initial-forms-6.0.0.rc21-10.x86_64	Initial system data structures ("forms").

bcos-java-tools-6.0.0.rc21-10.x86_64	Helper tools requiring Java runtime.
bcos-java-tools-utils-6.0.0.rc21-10.x86_64	Configuration properties for Java helper tools.
bcos-server-config-6.0.0.rc21-10.x86_64	Configuration scripts for the system server environment.
bcos-upgrade-databases-6.0.0.rc21-10.x86_64	Database upgrade scripts.
bcplatforms-bc-insight-container-setup-6.0.0.rc21-10.x86_64	Container environment setup scripts.
bcplatforms-bc-insight-gened-common-6.0.0.rc21-10.x86_64	Gened job queue system.
bcplatforms-bc-insight-postgresql-11-client-6.0.0.rc21-10.x86_64	PostgreSQL client module.
bcplatforms-bc-insight-postgresql-11-server-6.0.0.rc21-10.x86_64	PostgreSQL database creation script.
bcplatforms-bc-insight-service-bcapp-6.0.0.rc21-10.x86_64	Main Web user interface.
bcplatforms-bc-insight-service-httpd-6.0.0.rc21-10.x86_64	Apache HTTP service.
bcplatforms-bc-insight-service-httpd-dovecot-6.0.0.rc21-10.x86_64	Apache Dovecot service.
bcplatforms-bc-link-virtual-machine-6.0.0.rc21-10.x86_64	BC LINK virtual machine runtime configurations.
bcplatforms-client-6.0.0.rc21-10.x86_64	Calculation clients polling and executing jobs from the queue.
bcplatforms-packet-utils-6.0.0.rc21-10.x86_64	Helper binaries for compressing data.
bcplatforms-service-gened-6.0.0.rc21-10.x86_64	Gened job queue module.
bcplatforms-service-srv-clients-6.0.0.rc21-10.x86_64	Job client configurations.
bcplatforms-service-srv-sendjob-6.0.0.rc21-10.x86_64	Module for handling job results.
bcplatforms-service-tomcat8-6.0.0.rc21-10.x86_64	Tomcat Java application server.
bcplatforms-srv-bclink-clients-6.0.0.rc21-10.x86_64	BC LINK client module, polling jobs from BC RQUEST.
bcplatforms-srv-client-6.0.0.rc21-10.x86_64	Scripts to launch clients polling jobs from the queue.
bcplatforms-srv-client-utils-6.0.0.rc21-10.x86_64	Helper tools to manage jobs in the queue.

List of all RPM packages installed in the Connector environment

This chapter contains a full list of the RPM packages on the Connector server. Packages have been extracted from a Connector server with “rpm -qa | sort -n” command.

List of packages:

```
GConf2-3.2.6-8.el7.x86_64
ImageMagick-6.9.10.68-4.el7.x86_64
NetworkManager-1.18.8-2.el7_9.x86_64
NetworkManager-libnm-1.18.8-2.el7_9.x86_64
NetworkManager-team-1.18.8-2.el7_9.x86_64
NetworkManager-tui-1.18.8-2.el7_9.x86_64
NetworkManager-wifi-1.18.8-2.el7_9.x86_64
OpenEXR-libs-1.7.1-8.el7.x86_64
R-core-3.6.0-1.el7.x86_64
acl-2.2.51-15.el7.x86_64
adobe-mappings-cmap-20171205-3.el7.noarch
adobe-mappings-cmap-deprecated-20171205-3.el7.noarch
adobe-mappings-pdf-20180407-1.el7.noarch
adwaita-cursor-theme-3.28.0-1.el7.noarch
adwaita-icon-theme-3.28.0-1.el7.noarch
aic94xx-firmware-30-6.el7.noarch
alsa-firmware-1.0.28-2.el7.noarch
alsa-lib-1.1.8-1.el7.x86_64
alsa-tools-firmware-1.1.0-1.el7.x86_64
apache-commons-daemon-jsvc-1.0.13-7.el7.x86_64
apr-1.4.8-7.el7.x86_64
apr-devel-1.4.8-7.el7.x86_64
apr-util-1.5.2-6.el7.x86_64
at-3.1.13-24.el7.x86_64
at-spi2-atk-2.26.2-1.el7.x86_64
at-spi2-core-2.28.0-1.el7.x86_64
atk-2.28.1-2.el7.x86_64
audit-2.8.5-4.el7.x86_64
audit-libs-2.8.5-4.el7.x86_64
audit-libs-python-2.8.5-4.el7.x86_64
authconfig-6.2.8-30.el7.x86_64
autossh-1.4g-1.el7.x86_64
avahi-glib-0.6.31-20.el7.x86_64
avahi-libs-0.6.31-20.el7.x86_64
basesystem-10.0-7.el7.centos.noarch
bash-4.2.46-34.el7.x86_64
bc-1.06.95-13.el7.x86_64
bc-basic-queue-apps-6.0.0.rc21-10.x86_64
bc-basic-queue-db-apps-6.0.0.rc21-10.x86_64
```

```
bc-bcapp-tomcat-war-6.0.0.rc21-24.x86_64
bc-bcos-srv-6.0.0.rc21-10.x86_64
bc-csrf-6.0.0.rc21-10.x86_64
bc-db-postgresql-6.0.0.rc21-10.x86_64
bc-insight-initial-pg-database-6.0.0.rc21-10.x86_64
bc-insight-tools-6.0.0.rc21-10.x86_64
bc-liquibase-6.0.0.rc21-10.x86_64
bc-mod-python-6.0.0.rc21-10.x86_64
bc-opt-bcplatforms-files-6.0.0.rc21-11.x86_64
bc-pdfgen-6.0.0.rc21-10.x86_64
bc-postgresql-driver-6.0.0.rc21-10.x86_64
bc-rest-security-6.0.0.rc21-10.x86_64
bc-rsyslog-virtual-machine-6.0.0.rc21-10.x86_64
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HDR Gateway architecture diagram

The following page contains a diagram of the basic architecture of the HDR UK Gateway solution. The software providing the query and analytical properties is query portal. The anonymised data resides in Connector, isolated within Data Partner environments.

