PUBLIC

SAP Medical Research Insights 2.0 FP5

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Administration Guide - Based on SAP Connected Health Platform 1.0 FP5

THE BEST RUN SAP

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1 Getting Started

Related Information

About SAP Medical Research Insights [page 4]
About this Document [page 5]
System Requirements [page 6]

1.1 About SAP Medical Research Insights

SAP Medical Research Insights, powered by SAP HANA, is a browser-based application designed for use in medical and clinical research.

SAP Medical Research Insights is a native SAP HANA application that uses the SAP Connected Health platform as the underlying platform. The application combines structured and unstructured clinical information from various sources, such as clinical information systems, tumor registries, biobank systems, and even text documents like doctors' notes. With this application, users can filter and group patients according to different attributes, which can be customized for different research purposes, and can subsequently create cohorts. Users can even view genomic data from individual patients or patient groups. In addition, this application offers a comprehensive overview of each patient's medical history in a graphical timeline, making it easy to access information on any level of detail.

Filter Cards and Attributes

This document uses examples to explain the features of the application. Filter cards and attributes are configurable, which means the actual filter cards, attributes, labels, and information that you see in your application are based on the data model and system configuration of your organization.

Intended Use

This application is a research tool intended to help you perform the following tasks, for example:

- Analyze patient data to verify or develop research hypotheses
- Identify candidates for studies

Regulatory Disclaimer

This software gives instant access to information from multiple sources and allows visualizing and analyzing complex data sets in real-time. The software is not intended to be used for diagnostic or therapeutic purposes. In particular and without limitation, the software is not intended to be used for (i) final selection of patients for a clinical study, or (ii) the detection, prevention, surveillance, treatment or relief of diseases, (iii) the detection, surveillance, treatment, relief or compensation of injuries and handicaps, or (iv) the examination, substitution or change of the anatomical structure or a physiological process of a human being.

1.2 About this Document

This guide describes the main tasks and concepts necessary for the initial setup and administration of SAP Medical Research Insights.

This guide provides information required for components specific to the application and references to the standard documentation for SAP Connected Health. Any implementation or administration tasks required for external components belonging to your organization are not covered in this guide.

The following implementation aspects are covered in this guide:

- Installation
- Configuration
- Security

Related Documents

For information about how to use SAP Medical Research Insights, see the corresponding Application Help on SAP Help Portal.

For general information about configuring and administering SAP Connected Health, see the SAP Connected Health guides on SAP Help Portal.

1.3 System Requirements

Before installing or using the application, ensure the following system requirements are met:

Requirement	Details
SAP Connected Health 1.0 Feature Pack 5	• You can find a complete list of all SAP HANA components and the respective SAP HANA hardware and software requirements in the Product Availability Matrix (PAM) on SAP Support Portal. • For general information about deploying and using the platform, see the SAP Connected Health Platform Getting Started Guide. • For information about SAP HANA licensing and options, contact your SAP account team.
Supported Web browser	• Internet Explorer 11.1884.14393.0 • Mozilla Firefox 57 • Google Chrome 62.0.3202.94 • Apple Safari 11.0.1 on OS X

→ Recommendation

We recommend that users view the application with a minimum screen resolution of 1280 x 1024.

Related Information

Product Availability Matrix (PAM)

2 Installation and Update

Related Information

Installing SAP Medical Research Insights [page 7]
Updating from SAP Medical Research Insights 2.0 FP4 [page 10]
Deploying SAP Medical Research Insights on SAP HANA XS Advanced [page 14]
Installing Patches [page 17]

2.1 Installing SAP Medical Research Insights

To install the application on your SAP Connected Health system, download the software from SAP Software Download Center and import the required delivery units.

Prerequisites

- You have used the provided installation program to SAP Connected Health platform 1.0 Feature Pack 5 on a dedicated host.
- SAP HANA XS advanced runtime is installed on the same host as SAP HANA platform.
- Secure Sockets Layer (SSL) is activated.
- The user performing the installation or update was created by the installer program used for SAP Connected Health platform.
- To download the software, you have the required login credentials and authorizations for SAP Software Download Center.

Context

The software consists of the following delivery units:

- `HCO_HC_MRI`

> → Recommendation
>
> We strongly recommend you install SAP Medical Research Insights along with SAP Connected Health platform using the provided installer program.

However, if you don't want to use the automated installer of SAP Connected Health platform to install SAP Medical Research Insights, you can follow the manual steps in this procedure.

> ⚠ Caution
>
> Do not skip steps or perform steps in parallel. You must complete all steps in the sequence in which they are described. Otherwise, you will encounter issues.

Procedure

1. Download the most recent central ZIP file for SAP Medical Research Insights from SAP Software Download Center to a local folder.

   To locate the central ZIP file on SAP Software Download Center, proceed as follows:

   a. Go to https://support.sap.com/en/my-support/software-downloads.html and, under *Types of Software* > *Installations & Upgrades*, choose *Access Downloads*.
   b. Choose *By Alphabetical Index (A-Z)* and choose *M*.
   c. From the product list, select *SAP MED. RESEARCH INSIGHTS*.
   d. On the *DOWNLOADS* screen, select *SAP MED. RESEARCH INSIGHTS 2.0*.
   e. Select the *DOWNLOADS* tab and choose *INSTALLATION*.
   f. From the items list, select the file to download and choose the icon to add the file to your download basket.
   g. Go to the *DOWNLOAD BASKET* and download the ZIP files to a local folder.

   > → Remember
   >
   > The ZIP archives available here under *INSTALLATION* always represents the latest release.

2. Unpack the central ZIP file and save the contents to your local folder.

   The central ZIP file contains the following software component archives:

   - HCOHCMRI05_0
   - XSACMRICORE00_0

3. In the SAP HANA Security Console, re-activate the user used to install SAP Connected Health platform.

   Alternatively, you can create a new user to install SAP Medical Research Insights. If you do so, that user must have the same roles and privileges as the SAP Connected Health installation user.

4. In the *SAP HANA Development* perspective of SAP HANA studio, create a repository workspace for SAP Medical Research Insights.

5. Import the delivery unit `HCO_HC_MRI`.

   a. Open SAP HANA application lifecycle management.

      The SAP HANA Application Lifecycle Management is available on the SAP HANA XS Web server at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hana/xs/lm`

   b. Choose *INSTALLATION*.
   c. Import the `HCO_HC_MRI` delivery unit from the `HCOHCMRI05_0.ZIP` file.

Choose *Browse* to display a file explorer, which you can use to locate the delivery unit you want to import, and choose *Open*.

> **i Note**
>
> The import operation overwrites any identical objects in the target system with the content of the imported delivery unit.

6. Configure the technical user for SAP Connected Health for use with SAP Medical Research Insights.
   a. Connect to SAP HANA studio with the user you want to use to perform the installation, for example, the SYSTEM user.
   b. Open the *SAP HANA Administration Console* perspective.
   c. In the navigation tree for your SAP HANA instance, go to *Security* > *Users*.
   d. Locate the technical user, such as HPH_TECHNICAL_USER.
   e. Go to the *Granted Roles* tab and assign this user the technical role `sap.hc.mri.roles::HC_MRI_TECH_CONNECTION`.
   f. Go to the *Object Privileges* tab and assign this user Execute privileges on the object `sap.hc.hph.install.db.procedures::GrantMRIRoles`.
   g. Call the stored procedure `sap.hc.hph.install.db.procedures::GrantMRIRoles`. This enables SAP Medical Research Insights to access the technical users of SAP Connected Health platform.
   h. Start the *SAP HANA XS Administration Tool*.

      The *SAP HANA XS Administration Tool* tool is available on the SAP HANA XS Web server at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hana/xs/admin/`.

      > **i Note**
      >
      > In the default configuration, the URL redirects the request to a logon screen, which requires the credentials of an authenticated SAP HANA database user to complete the logon process. The user who logs on must have the privileges required (`sap.hana.xs.admin.roles::SAMLViewer`) to perform administration tasks with the *XS Artifact Administration* tool.

   i. In the *Application Objects* list, locate the SQL connection configuration object `sap.hc.mri::TechnicalConnection.xssqlcc`.

      You can find the *Application Objects* list under *sap* > *hc* > *mri* > *SQL Connection Configurations*.
   j. In the *SQL Connection Details*, specify the technical user and password as the user whose credentials are used to establish the SQL connection.
   k. Set the runtime status of the XS SQL connection configuration to *Active* and save your changes.

   For more information about how to configure the technical user, see *Setting up the Technical User* in the SAP Connected Health Platform Administration Guide.
7. Check for and install any patches that are available for SAP Medical Research Insights.

   For more information, see Installing Patches [page 17].
8. Deploy the SAP Medical Research Insights back-end services, which comprise the `XSACMRICORE00_0.ZIP` file, on SAP HANA XS advanced.

   For details, see Deploying SAP Medical Research Insights on SAP HANA XS Advanced [page 14].
9. Activate the *SAP Medical Research Insights Roles Plug-In* and verify it is active in the *Plug-In Cockpit*.
   a. Activate the plug-in by calling the following URL from your browser using your administrative user, such as HPH_ADMIN:

`https://<WebServerHost>:43<SAPHANAinstance>/sap/hc/hph/core/services/PluginRegistry.xsjs?action=loaddefaultextensions`

This activates the *SAP Medical Research Insights Roles Plug-In* plug-in as well as the default plug-ins for SAP Connected Health.

If activation is successful, the response *true* appears.

b. To ensure the plug-in is active, go to the SAP Fiori launchpad for SAP Connected Health.

The SAP Fiori launchpad is available at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hana/uis/clients/ushell-app/shells/fiori/FioriLaunchpad.html?siteId=sap.hc.hph.flp|hph#`

c. Open the *Plug-In Cockpit* application.

d. Search for the *SAP Medical Research Insights Roles Plug-In* and ensure it is active.

Related Information

Technical Role [page 35]
Analytic Privileges [page 36]
Installing SAP Connected Health Platform
Setting Up the Technical User
SAP Connected Health Administraion Guide

2.2 Updating from SAP Medical Research Insights 2.0 FP4

This procedure describes the steps necessary to update from SAP Medical Research Insights 2.0 FP4 (latest patch level) to SAP Medical Research Insights 2.0 FP5 (latest patch level).

Prerequisites

- You have installed SAP Connected Health 1.0 Feature Pack 5.
- SAP HANA XS advanced is installed as part of the installation of SAP Connected Health platform.
- To download the software, you have the required logon credentials and authorizations for SAP Software Download Center.
- You have set up the technical user for SAP Connected Health and the technical connection is active. For more information about how to configure the technical user, see *Setting up the Technical User* in the SAP Connected Health Platform Administration Guide.
- You have configured the technical user for SAP Connected Health for use with SAP Medical Research Insights.
- As recommended, you have set up secure communication (HTTPS) between client applications and SAP HANA.

- The user performing the update is granted at least the following roles:
  - sap.hana.admin.roles::Administrator
  - sap.hana.xs.lm.roles::Administrator
  - sap.hana.xs.admin.roles::HTTPDestAdministrator

Context

To update to the latest version of SAP Medical Research Insights 2.0, you download the central ZIP file for SAP Medical Research Insights 2.0 FP5 and deploy the following SAP HANA delivery unit:

- HCO_HC_MRI

> ⚠ Caution
>
> Do not skip steps or perform steps in parallel. You must complete all steps in the sequence in which they are described. Otherwise, you will encounter issues.

Procedure

1. Download the central ZIP file for SAP Medical Research Insights 2.0 FP5 from SAP Software Download Center to a local folder.

   To locate the central ZIP file on SAP Software Download Center, proceed as follows:

   a. Go to https://support.sap.com/en/my-support/software-downloads.html and, under *Types of Software* > *Installations & Upgrades*, choose *Access Downloads*.
   b. Choose *By Alphabetical Index (A-Z)* and choose *M*.
   c. From the product list, select *SAP MED. RESEARCH INSIGHTS*.
   d. On the *DOWNLOADS* screen, select *SAP MED. RESEARCH INSIGHTS 2.0*.
   e. Select the *DOWNLOADS* tab and choose *INSTALLATION*.
   f. From the items list, select the file to download and choose the icon to add the file to your download basket.
   g. Go to the *DOWNLOAD BASKET* and download the ZIP files to a local folder.

      > → Remember
      >
      > The ZIP file available here under *INSTALLATION* always represents the latest release.

2. Unpack the central ZIP file and save the contents to your local folder.

   The ZIP file contains the following software component archives:

   - HCOHCMRI05_0
   - XSACMRICORE00_0

3. Check whether patches are available for the most recent support package for SAP Medical Research Insights by reading SAP Note 2228300.
4. If patches are available, download the individual patch files from SAP Software Download Center to a local folder.

To locate the patch files on SAP Software Download Center, proceed as follows:

a. Go to https://support.sap.com/en/my-support/software-downloads.html and, under *Types of Software* > *Support Packages & Patches*, choose *Access Downloads*.
b. Choose *By Alphabetical Index (A-Z)*, choose *M*.
c. From the product list, select *SAP MED. RESEARCH INSIGHTS*.
d. On the *Downloads* tab, select *SAP MED RESEARCH INSIGHTS 2.0*.
e. Select *COMPRISED SOFTWARE COMPONENT VERSIONS*.
f. In the *HANA CONTENT MRI CORE 100* content folder, select *#OS INDEPENDENT* > *SAP HANA DATABASE* and, from the items list, identify whether any zip files for the patch exist. If so, add them to your download basket.

> → Tip
>
> The description of each item includes the feature pack (support package level) and patch number.

g. Go to the *DOWNLOAD BASKET* and download the zip files to a local folder.

> i Note
>
> If there are multiple `HANA CONT` content folders, ensure that you check all of these and download all available ZIP files with the appropriate patch number.

5. Open SAP HANA application lifecycle management.

   The SAP HANA Application Lifecycle Management is available on the SAP HANA XS Web server at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hana/xs/lm`
6. Choose *INSTALLATION*.
7. Import the `HCO_HC_MRI` delivery unit.

   Choose *Browse* to display a file explorer, which you can use to locate the delivery unit you want to import, and choose *Open*.

   > i Note
   >
   > The import operation overwrites any identical objects in the target system with the content of the imported DU.

8. As in the previous step, import the downloaded ZIP files for any available patches for SAP Medical Research Insights.
9. Deploy the SAP Medical Research Insights back-end services, which comprise the `XSACMRICORE00_0.ZIP` file, on SAP HANA XS advanced.

   For details, see Deploying SAP Medical Research Insights on SAP HANA XS Advanced [page 14].
10. Activate the *SAP Medical Research Insights Roles Plug-In* and verify that it's active in the *Plug-In Cockpit*.
    a. Activate the plug-in by calling the following URL from your browser using your administrative user, such as HPH_ADMIN:

       ```
       https://<WebServerHost>:43<SAPHANAinstance>/sap/hc/hph/core/services/PluginRegistry.xsjs?action=loaddefaultextensions
       ```

       This activates the *SAP Medical Research Insights Roles Plug-In* plug-in as well as the default plug-ins for SAP Connected Health.

If activation is successful, the response *true* appears.

b. To ensure that the plug-in is active, go to the SAP Fiori launchpad for SAP Connected Health.

   The SAP Fiori launchpad is available at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hana/uis/clients/ushell-app/shells/fiori/FioriLaunchpad.html?siteId=sap.hc.hph.flp|hph#`

c. Open the *Plug-In Cockpit* application.

d. Search for the *SAP Medical Research Insights Roles Plug-In* and ensure it is active.

11. If you want to use existing clinical data model configurations for the new genomic views (*Gene Summary* and *Gene Alteration Matrix*), update your configurations as follows:

    a. Go to the SAP Fiori Launchpad for SAP Connected Health, log on as administrative user, and open the *Clinical Data Model Configuration* application.

    b. Open the configuration you want to update.

    c. Find the interaction for gene variants. You will recognize this as the interaction that has the `genomics_variant_location` annotation in one of its attributes.

    d. Add the following attributes to this interaction:

Attribute Name	AttributeID	*Advanced Tab* > *Normal Attribute* > *Data Source (Expression)*	Data Type	Annotations
DWAuditID	dw_audit_id	@INTERACTION."DWAuditID"	Text	genomics_dw_audit_id
Variant Index	variant_index	@INTERACTION."VariantIndex"	Text	genomics_variant_index
Allele Index	allele_index	@INTERACTION."AlleleIndex"	Text	genomics_allele_index
Sample Index	sample_index	@INTERACTION."SampleIndex	Text	genomics_sample_index

    e. Save and activate the configuration.

    f. From the SAP Fiori launchpad, open the *Patient Analytics Configuration* application.

    g. Ensure the *Patient Analytics* configuration that you want to use is using the most recent active version of the clinical data model configuration.

Related Information

Technical Role [page 35]

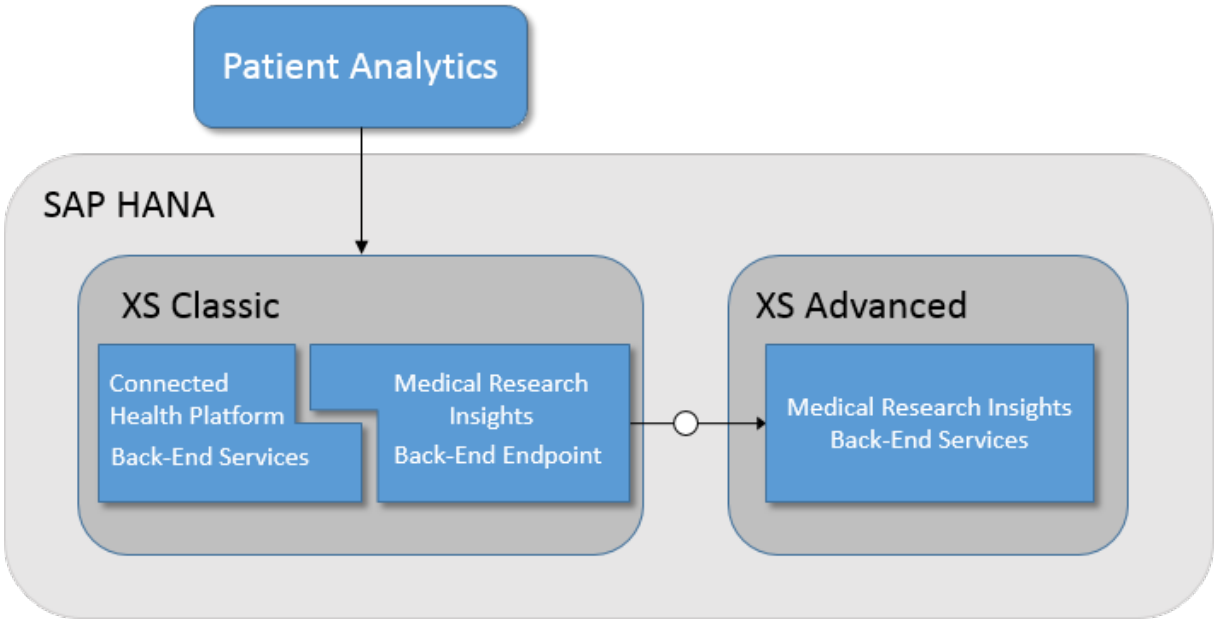
2.3 Deploying SAP Medical Research Insights on SAP HANA XS Advanced

Prerequisites

- You have set up SAP HANA XS advanced for use with SAP Connected Health.
- You have downloaded the central ZIP file for SAP Medical Research Insights, which contains the required software component archive `XSACMRICORE00_0` for SAP HANA XS advanced.
- You have installed SAP Medical Research Insights 2.0 FP5 on SAP HANA XS classic. This means, you have deployed the SAP HANA delivery unit `HCO_HC_MRI` as part of either installation or update of SAP Medical Research Insights.

Context

After you deploy and configure the SAP Medical Research Insights objects for SAP HANA XS advanced, your system landscape (with respect to XS classic and XS advanced) should look like this:



→ Tip

If you experience issues during any of the following steps, check out the information available in Troubleshooting [page 42].

Procedure

1. Generate the key pair which is required for communication between SAP HANA XS classic and SAP HANA XS advanced. The key pair generator is protected and, therefore, you must log on as the platform administrative user to generate the key pair.
   a. Go to the SAP Fiori launchpad for SAP Connected Health.

      The SAP Fiori launchpad is available at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hana/uis/clients/ushell-app/shells/fiori/FioriLaunchpad.html?siteId=sap.hc.hph.flp|hph#`
   b. Log on as the platform administrative user, who is assigned the role `HC_HPH_PLUGINS_ADMIN`.
   c. In your browser, open the following URL:

      `https://<hostname>:43<instance number>/sap/hc/mri/services/genKey.xsjs`
   d. Copy the public key that appears.

      You need this public key when you create the required back-end service in SAP HANA XS advanced.

      The following is an example of the public key you need to copy:

      Sample Code

      ```
      "-----BEGIN PUBLIC KEY-----\r
      \nMFkwEwYHKoZIzj0CAQYIKoZIzj0DAQcDQgAEjMp5dfVGycIFlyBJNpHV7hl7PHHE
      \r\nkOhN5NkuOaplMuBGajueFpXAxJcV+OAMkorbQAzvYhLSJTp82rn+Ij0Mjw==\r
      \n-----END PUBLIC KEY-----\r\n"
      ```

      Note

      Make sure you copy the key as shown.
2. Use the SAP HANA XS advanced command-line client to log in to SAP HANA XS advanced.
   a. To log in, go to `<xsa client folder>/bin` and enter the command `xs login`.
   b. Log in as the XSA_ADMIN user, which you created when installing SAP HANA XS advanced runtime.
   c. If you created a custom space during installation of SAP HANA XS advanced runtime, specify that as your space. Otherwise, specify the `SAP` space for creating the required back-end service, as well for the following steps regarding trust relationship setup.
3. Create the required back-end service in SAP HANA XS advanced by executing the following command:

   ```
   xs cups mridb-prod -p '{"host":"localhost","password":"<your
   password>","port":3<instance number
   xx>15,"schema":"SAP_HPH","user":"HPH_TECHNICAL_USER","pubKey":"<public_key>"}'
   ```
4. Deploy SAP HANA XS advanced for SAP Medical Research Insights using one of the following options:
   - If you want to use the default port (3000), then execute the command `xs install <SCA_zip_file_name>`.
   - If you want to change the port number, proceed as follows:
     1. Create a new `mri.mtaext` file with the following contents:

        ```
        _schema-version: "3.1.0"
        ID: XSA_MRI-RUNTIME-CONFIG
        extends: com.sap.hc.mri.hana.sca
        modules:
        ```

```
  - name: mri
    parameters:
      port: <new_port_number>
```

2. Execute the command `xs install <SCA_zip_file_name> -e mri.mtaext`.

5. Log in to the *SAP HANA XS Administration Tool* as any administrative or system user who has the role `sap.hana.xs.admin.roles::HTTPDestAdministrator`.

   The *SAP HANA XS Administration Tool* tool is available on the SAP HANA XS Web server at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hana/xs/admin/`.

6. In the *XS Artifact Administration* tool, configure the HTTP destination for the `xsa.xshttpdest` object.

   a. Open the `xsa.xshttpdest` object under *sap* > *hc* > *mri*.

   b. Optionally, if you want to use a different host with different connection settings, extend the destination to a new package.

      To do so, choose *Extend* > *New Package*, specify an extension package not in the SAP namespace, and choose *Create Extension*.

   c. Configure the details of the HTTP destination.

      Make sure you include the following:

      - Under *General Information*, specify the port and URL of SAP HANA XS advanced where you deployed SAP Medical Research Insights.
      - Under *Authentication Details* > *SSL Enabled*, choose *Client Certificate* as the SSL authentication type. Specify the trust store you created during setup of SAP HANA XS advanced.

      For more information about configuring HTTP destinations, see Edit an HTTP Destination Runtime Configuration in the SAP HANA Administration Guide.

Results

To verify that SAP Medical Research Insights is correctly deployed on SAP HANA XS advanced runtime, you can call the following URL: `https://<hostname>:<XSA port number>/sap/hc/mri/pa/pollMRIXSA.xsjs`.

> **→ Remember**
>
> The default XSA port number is 3000.

> **→ Recommendation**
>
> If you've deployed SAP HANA XS classic and SAP HANA XS advanced on the same host server, we strongly recommend limiting the port number for SAP HANA XS advanced to the local host only.

This returns a status message indicating success or failure.

> **→ Tip**
>
> Alternatively, you can verify the deployment status by checking the XSA logs, which indicate whether the application was started succesfully. To do so, execute the command **`xs logs mri --recent`** in the SAP HANA XS advanced command-line client.

Related Information

Troubleshooting [page 42]
Installing and Updating Products and Software Components in SAP HANA XS Advanced Model

2.4 Installing Patches

Periodically check for available patches for SAP Medical Research Insights on SAP Software Download Center and install them using SAP HANA Application Lifecycle Management.

Prerequisites

- You have installed SAP Connected Health.
- You have installed SAP Medical Research Insights.
- You have installed any available patches for SAP Connected Health.

Context

Patches are occasionally released for SAP Medical Research Insights 2.0 to correct any known technical issues that may have occurred for a specific version of the product. We recommend that you periodically check for and install any patches that are available.

Procedure

1. Check whether patches are available for your version of SAP Medical Research Insights by referring to SAP Note 2228300.

   > **i Note**
   >
   > For each available patch, take note whether you need to follow any special steps, in addition to the standard steps outlined here.

2. If patches are available, go to SAP Software Download Center to locate and download the relevant individual patches to a local folder.
   a. Go to https://support.sap.com/en/my-support/software-downloads.html and, under *Types of Software* > *Support Packages & Patches* >, choose *Access Downloads*.
   b. Choose *By Alphabetical Index (A-Z)*, choose *M*.
   c. From the product list, select *SAP MED. RESEARCH INSIGHTS*.

d. On the *Downloads* tab, select *SAP MED RESEARCH INSIGHTS 2.0*.
e. On the *Downloads* tab, then select *COMPRISED SOFTWARE COMPONENT VERSIONS*.
f. In the *HANA CONTENT MRI CORE 100* content folder, select *#OS INDEPENDENT* > *SAP HANA DATABASE* and, from the items list, identify whether any zip files for the patch exist. If so, add them to your download basket.

> → Tip
>
> The description of each item includes the feature pack (support package level) and patch number.

g. In the *HANA XSA CONTENT MRI CORE 1.0* content folder, select *#OS INDEPENDENT* and, from the items list, identify whether any zip files for the patch exist. If so, add them to your download basket.

> → Tip
>
> The description of each item includes the feature pack (support package level) and patch number.

h. Go to the *DOWNLOAD BASKET* and download the ZIP files to a local folder.

> i Note
>
> If there are multiple content folders, ensure that you check all of these and download all available ZIP files with the appropriate patch number.

3. Import the downloaded ZIP file for the `HANA CONTENT MRI CORE 100` content.
   a. Open the SAP HANA Application Lifecycle Management.

      The SAP HANA Application Lifecycle Management is available on the SAP HANA XS Web server at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hana/xs/lm`
   b. Choose *INSTALLATION*.
   c. Import the ZIP files.

      Choose *Browse* to display a file explorer, which you can use to locate the ZIP archive you want to import, and choose *Open*.

      > i Note
      >
      > The import operation overwrites any identical objects in the target system with the content of the imported DU.

   d. Choose *Install*.
4. Import the downloaded ZIP file for the `HANA XSA CONTENT MRI CORE 1.0` content.
   a. Use the SAP HANA XS advanced command-line client to log in to SAP HANA XS advanced.
      1. To log in, go to `<xsa client folder>/bin` and enter the command `xs login`.
      2. Log in as the XSA_ADMIN user, which you created when installing SAP HANA XS advanced runtime.
   b. Install the ZIP file by executing the command `xs install <SCA_zip_file_name>`.

3 Configuration

Configuring SAP Medical Research Insights involves configuring the *Patient Analytics* application, as well as the underlying applications delivered as part of SAP Connected Health.

The following table outlines the applications you use to create an end-to-end configuration that enables users to view patient data correctly:

App	Related Product	Purpose
Clinical Data Model Configuration	SAP Connected Health	You configure which clinical entities and attributes you want to use as content in your applications.
Advanced Settings for Clinical Data Model Configurations	SAP Connected Health	You configure settings that apply globally to all clinical data model configurations. → Tip This application is not included in the standard SAP Fiori launchpad catalog for SAP Connected Health. To access the corresponding tile, search for it in the tile catalog and add it manually to your SAP Fiori launchpad.
Patient Summary Configuration	SAP Connected Health	Based on a specified clinical data model configuration, you configure the features available in the *Patient Summary* application, which appears when a user opens an individual patient from the *Patient Analytics* application.
Patient Analytics Configuration	SAP Medical Research Insights	Based on a specified clinical data model configuration, you configure the filter cards, filter attributes, charts, and patient list that appear in the *Patient Analytics* application.
Configuration Assignment	SAP Connected Health	You assign the configurations you've created to specific users or organizations.

> **i Note**
>
> For more information about any of the applications belonging to SAP Connected Health, see the SAP Connected Health Platform Administration Guide.

Related Information

Configuring Patient Analytics [page 20]
Clinical Data Model Configuration
Configuring the Patient Summary
Assigning Configurations to Users

3.1 Configuring Patient Analytics

Context

To configure the filter cards, filter attributes, charts, and patient list of *Patient Analytics* you select basic patient data, interactions, and attributes defined in a clinical data model configuration. As your organization probably has multiple clinical data model configurations, each with multiple versions, you have to select which configuration you want to use as basis for your Patient Analytics configuration.

To configure the features of *Patient Analytics*, proceed as follows:

Procedure

1. Go to the SAP Fiori launchpad for SAP Connected Health.

   The SAP Fiori launchpad is available at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hc/hph`
2. Launch the *Patient Analytics Configuration* application.
3. Select the data model configuration on which you want to base your Patient Analytics configuration.
4. Add a new configuration or choose an existing Patient Analytics configuration.
5. Specify a name for the configuration.

   > **→ Recommendation**
   >
   > As your system can support numerous configurations, to avoid later confusion, we recommend that you choose a descriptive name that indicates the intent, purpose, or role of the related users.

6. On the *Configuration Details* tab, specify the following:

Configuration Detail	Description
Clinical Data Model Version	Select a version of the data model configuration.
Notes	You can enter notes on use and purpose of this configuration.

The data model version that is marked as *Active Version* is the version that is recommended for use.

7. Configure the filter cards, filter attributes, charts, and patient list.
Optional: If required, configure general *Patient Analytics* settings on the *Application Settings* tab:

Configuration Option	Description
Page Title	Enter a new title here if you want to override the standard Web browser page title for *Patient Analytics*.
"Match Any" Filter Card Section	If you do not want to make the *Match any of the following* filter card section available, deactivate this option by turning the toggle switch to *OFF*.
"Time" Filter Control	If you do not want to make the *Time* filter control available, deactivate this option by turning the toggle switch to *OFF*.
Use Next Interaction Instead of Advanced Time	Specify here if you want the *Next Interaction* filter control to be available for filter cards instead of the *Advanced Time* filter control for specifying time constraints.
Include Attribute Name in "Not Specified" Text	If you want to include the attribute name along with the *Not Specified* text on the x-axis when a value is not specified for an attribute, activate this option by turning the toggle switch to *ON*.

8. Save the configuration.

Related Information

Managing Configurations [page 21]
Adapting to More Recent Versions of the Data Model Configuration [page 23]
Configuring Filter Cards and Filter Attributes [page 24]
Configuring Charts [page 26]
Configuring the Patient List [page 29]
Enabling Users to View Genomic Content [page 30]

3.1.1 Managing Configurations

When you open the *Patient Analytics* application and select a data model configuration, you see an overview of all available *Patient Analytics* configurations that are based on this clinical data model configuration. From this

overview, you can manage your *Patient Analytics* configurations, which includes creating, duplicating, validating, and activating configurations.

From the overview screen, you can perform the following actions to manage your configurations:

Action	Details
Create	You can create a *Patient Analytics* configuration by simply choosing *Add Configuration* and giving it a unique name.
Save	To save and activate a *Patient Analytics* configuration, you choose *Save*.
Validate	Before you save a *Patient Analytics* configuration, you can validate it to see if there are inconsistencies or compatibility issues that could prevent its activation.
Delete	You can delete a *Patient Analytics* configuration that you no longer need. **i Note** Deleting configurations may have a negative impact on read-access logging, as information from the configuration may be necessary to interpret the log messages generated by Patient Analytics. Please do not delete any configurations without first considering the security impacts.
Duplicate	You can create a new *Patient Analytics* configuration by duplicating an existing configuration and editing it. You can display the option to duplicate a configuration by choosing the ••• (*More*) icon for the configuration you want to duplicate.
Preview	You can view each *Patient Analytics* configuration in JSON format. You preview a configuration by choosing the ••• (*More*) icon for the *Patient Analytics* configuration and then *Preview*. You can use this preview to copy and paste the configuration into an external editor.
Import	You can import *Patient Analytics* configurations that were edited and saved in JSON format by an external editor program. You import a configuration by choosing the ••• (*More*) icon for the *Patient Analytics* configuration and then *Import*. You then select a version of the data model configuration version and paste your configuration in JSON format into the input field and choose *Import*.

Action	Details
Export	You can export *Patient Analytics* in JSON format to an external file. You export a configuration by choosing the ••• (*More*) icon for the *Patient Analytics* configuration you want to export and then *Export*. The JSON file is automatically saved to your default download folder.
View validation errors	The validity status of a configuration is indicated by the icon to the top right of each configuration listed: • Configuration is invalid:  • Configuration status is unknown:  • Configuration is valid:  If your configuration is invalid, choose the  icon to view detailed information about the source of the validation errors. You can also view detailed information by choosing the  icon when you have started to modify your configuration, for example, and want to see remaining errors before you validate again.

3.1.2 Adapting to More Recent Versions of the Data Model Configuration

Context

You base your Patient Analytics configurations on a specific version of a data model configuration. A warning in the *Patient Analytics Configuration* application informs you when a more recent version of this data model configuration is available. You can select the more recent version of the data model configuration and select whether you want to adapt the *Patient Analytics* configuration accordingly.

Procedure

1. Go to the SAP Fiori launchpad for SAP Connected Health.

The SAP Fiori launchpad is available at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hc/hph`

2. Launch the *Patient Analytics Configuration* application.
3. Select the data model configuration on which the *Patient Analytics* configuration is based.

   If a more recent active version of the data model version is available, you see a warning.
4. For the configuration that you want to update, select the most recent version of the clinical data model configuration.

   The clinical data model configuration version that is marked as *Active Version* is the version that is recommended for use.
5. Choose whether you keep the current settings or discard the current settings.

   If you discard the current settings of the *Patient Analytics* configuration, you have to configure the filter cards, filter attributes, charts, and patient list again.

   If you keep the current settings of the *Patient Analytics* configuration, any interactions and attributes that were added to the selected version of the clinical data model configuration are not activated by default when you update your configuration. To activate these, ensure you set the relevant toggle switches to *ON* on the *Filter Cards* tab.
6. To save the settings, save the configuration.

3.1.3 Configuring Filter Cards and Filter Attributes

Context

To configure filter cards and filter attributes, you select basic patient data, interactions, and attributes that are defined in a clinical data model configuration. Since your organization probably has multiple clinical data model configurations, each with multiple versions, you have to select which configuration and configuration version you want to use as basis for your *Patient Analytics* configuration.

To configure the filter cards and filter attributes of *Patient Analytics*, proceed as follows:

Procedure

1. Go to the SAP Fiori launchpad for SAP Connected Health.

   The SAP Fiori launchpad is available at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hc/hph`
2. Launch the *Patient Analytics Configuration* application.
3. Select the data model configuration and the *Patient Analytics* configuration you want to configure.
4. Choose the *Filter Cards* tab.

5. To define a filter card, select the interaction that you want to use as a filter card. Ensure that the toggle switch of the required interaction is set to *ON*.

   You can't switch off the *Basic Data* filter card. In *Patient Analytics*, the *Basic Data* filter card is always displayed.

6. To configure filter attributes for filter cards or charts, choose an interaction to open a list with the attributes of the interaction.

   Even if you don't want to use an interaction as a filter card, you can still configure the attributes of the interaction so that you can use them in the charts.

7. Specify whether the filter card appears on the user interface by default when the user starts the *Patient Analytics* application. To do so, select the *Display Filter Card at Application Start* checkbox.

   To allow an interaction to be used as a filter card, ensure that the toggle switch of the interaction is set to *ON*.

8. Check the following settings for the filter attributes:

   > **i Note**
   >
   > Default settings are applied here automatically when you create a configuration. You can check and adjust these settings in this step.

Option	Description
Order	To define the order in which the attributes appear on the filter card, choose an attribute and use the arrows to move it up or down.
Name	Name of the attribute
Visible	To specify that the attribute appears on the filter card, turn the toggle switch to *ON*.
Initial	Specify whether the attribute appears on the filter card by default when the user selects the filter card.
Show Descriptions	If the attribute is configured as a catalog attribute in the clinical data model, select this option to display the configured explanatory text for the values of the attribute. If this option is selected, the explanatory text is displayed in the filter card as tooltip to the dropdown menu of possible values for the attribute.
Show All Codes	If the attribute is configured as a catalog attribute in the clinical data model, select this option to display all possible valid values for an attribute. If this option is selected, the user can select all possible values for the attribute from a dropdown menu in the filter card, and invalid user entries for values are marked in red.
X-Axis	Specify whether the attribute can be selected for the x-axis of the charts.
Y-Axis	Specify whether the attribute can be selected for the y-axis of the charts.
Data Binning	Specify whether data binning should be enabled for numeric attributes. If you select this option, the values for an attribute can be grouped in data bins on the x-axis of the charts.

Option	Description
Caching	Specify whether data for this attribute should be cached. Caching improves the performance of the application. Deselecting this option is only recommended for attributes for which the data could change while the users are working with *Patient Analytics*, such as the Cohort attribute, whose data changes when the users create a new cohort.
Default Bin Size	Specify a default data bin size for grouping values on the x-axis of the charts or leave empty.

9. To define the order in which the filter cards appear, choose a filter card and use the arrows to move it up or down.
10. To save the settings, save the configuration.

3.1.4 Configuring Charts

Context

On the *Charts* tab, you can select following chart types:

- Bar chart
- Box plot chart
- Kaplan-Meier chart

You can also select the *Patient List* and the *Variant Browser*.

On the *Filter Cards* tab, you select the attributes you want to display initially on the x-axis and y-axis of the charts.

To configure the filter attributes of *Patient Analytics*, you select basic patient data, interactions, and attributes of a clinical data model configuration. Since your organization probably has multiple clinical data model configurations, each with multiple versions, you have to select which configuration you want to use as basis for your *Patient Analytics* configuration.

Procedure

1. Go to the SAP Fiori launchpad for SAP Connected Health.

   The SAP Fiori launchpad is available at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hc/hph`
2. Launch the *Patient Analytics Configuration* application.
3. Select the data model configuration and the *Patient Analytics* configuration you want to configure.

4. On the *Filter Cards* tab, configure the attributes that you want to use for the charts. Specify whether the attributes can be selected for the x-axis or y-axis of the charts.

> **i Note**
>
> Any attribute used as an initial attribute for an axis on the *Charts* tab must be set to visible and defined as an initial filter card attribute. *Display Filter Card at Application Start* must also be selected for the attribute's filter card.

5. Open the *Charts* tab.
6. Specify the categories (x-axis) and measures (y-axis) you want to initially appear on the charts by default when the user views a chart.
7. Specify which type of chart appears initially.
8. Specify the minimum patient count for the charts.

> **i Note**
>
> For security reasons, you should not set the minimum patient count to a value less than the value specified to trigger the requirement to use read access logging.

> **i Note**
>
> For privacy reasons, the charts in *Patient Analytics* display only aggregated patient data. You configure a minimum patient count so that search results containing fewer patients than this minimum patient count aren't visualized in the charts and users can't identify individual patients in the charts.
>
> This threshold is also used to restrict values displayed in a filter card dropdown for catalog attributes. If the *Show All Codes* option is not selected for a catalog attribute on the *Filter Cards* tab, data is retrieved from the patient table. If the number of aggregated patients for a filter card dropdown entry is below the threshold, these entries are not displayed for selection. This prevents users from being able to identify individual patients.

9. Select the charts that you want to use in *Patient Analytics*. To do so, turn the toggle switch of the charts to *ON*. You can also select the *Genomic Views* and *Patient List*.

> **i Note**
>
> You need to activate at least one of the chart types listed so that users of the configuration can access at least one chart or the *Genomic Views* or *Patient List* in *Patient Analytics*.

10. For each chart that you want to use, specify whether the *Export to CSV File* and *Export to PDF File* buttons are to be made available. To do so, choose the chart and the relevant checkboxes.

> **⚠ Caution**
>
> If these buttons are activated for the *Patient List* when audit logging is active for SAP Medical Research Insights, a significant amount of time may be required to complete these exports depending on the number of patients in the list.

11. For each chart that you want to use, specify whether the *Add to Cohort* button is to be made available for the chart. To do so, choose the chart and select the checkbox.

> **Note**
>
> If you don't select the *Export to CSV File*, *Export to PDF File*, or *Add to Cohort* checkboxes, these buttons aren't made available in *Patient Analytics* for any users who are assigned and use this configuration.

12. For the bar chart and box plot chart, choose *Show Categories with No Patients* if you want all categories in these charts to be displayed even if a category has no matching patients.

    This option only applies to charts when at least two values have been specified for the x-axis or if data binning has been applied. If you do not select this option, categories for which there are no matching patients are removed from the chart.

13. For the Kaplan-Meier chart, specify the following:
    - The confidence interval of the survival curves
      Note that the confidence interval is specified in terms of the standard score, that is the number of standard deviations from the mean. For example, 1.96 corresponds to a symmetric interval that covers a total probability of 95%.
    - The interactions to be used to determine the vital status
      The *Interactions Verifying Vital Status* should be interactions that can be used to determine at which point in time a patient was still alive. For example, a chemotherapy treatment can be an *Interaction Verifying Vital Status*, but an autopsy wouldn't be suitable. What you specify for *Interactions Verifying Vital Status* are the events that determine when patients are censored. This influences what is displayed to users as *Censoring Events* in the Kaplan-Meier chart.

      > **Note**
      >
      > Censoring events are the dates after which a patient is removed from the number of survivors in the Kaplan-Meier analysis. This might be required if contact is lost with a patient or a patient drops out of a study, since the event of interest doesn't exist. So if the patient's event of interest doesn't exist, the censoring event is the date of the last known contact, which SAP Medical Research Insights defines as the most recent interaction verifying the vital status.

    - The interactions that users can select as their event of interest; these are used as end points in the Kaplan-Meier analysis

14. For the *Patient List*, specify the number of patients listed per page.
15. For the *Genomic Views*, specify the reference genome used in the *Variant Browser*.
16. To save the settings, save the configuration.

Related Information

Configuring Filter Cards and Filter Attributes [page 24]
Configuring a Minimum Patient Count [page 32]

3.1.5 Configuring the Patient List

Context

To configure the patient list of *Patient Analytics*, you select basic patient data, interactions, and attributes of a clinical data model configuration. Since your organization probably has multiple clinical data model configurations, each with multiple versions, you have to select which configuration you want to use as basis for your *Patient Analytics* configuration.

For the patient list, you select the basic data attributes and interaction attributes that can be used as columns of the list. You configure which attributes are displayed initially as default columns and which attributes provide a link to the *Patient Summary* application.

Procedure

1. Go to the SAP Fiori launchpad for SAP Connected Health.

   The SAP Fiori launchpad is available at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hc/hph`
2. Launch the *Patient Analytics Configuration* application.
3. Select the data model configuration and the *Patient Analytics* configuration you want to configure.
4. On the *Charts* tab, select the patient list and specify the patients per page.
5. On the *Patient List* tab, select and configure the attributes that you want to use to build columns of the patient list. To do so, choose an interaction to open a list of the attributes for the interaction.
6. Select the attributes that are used in the patient list by turning the toggle switch to *ON*.

   The selected attributes are either displayed initially as default columns or can be selected by the users.
7. Select which attributes are displayed initially as default columns of the patient list.
8. Select which attributes provide a link to the *Patient Summary* application.

   For example, if you select the *Patient ID* attribute, users can choose a patient's ID to view the patient's medical data in the *Patient Summary* application.
9. To define the order of the initially displayed columns of the patient list, move the attributes and arrange them in the desired sequence.
10. To save the settings, save the configuration.

3.1.6 Enabling Users to View Genomic Content

For users to use the *Genomic Views*, view genomic information in the *Variant Browser*, or create filter cards to filter by genomic information, you must configure genomic content in *Patient Analytics Configuration* and ensure that your clinical data model configuration supports genomic data.

Prerequisites

- You have integrated genomic data into SAP Connected Health.

Context

For a clinical data model configuration to correctly support genomic data in the *Genomic Views* in *Patient Analytics*, it should use the *Genome Sequencing* and *Genetic Variant* interactions that are added to your configuration when you create a new configuration. You should then activate these interactions in the appropriate *Patient Analytics* configurations.

Procedure

1. Go to the SAP Fiori launchpad for SAP Connected Health.

   The SAP Fiori launchpad is available at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hc/hph`
2. Open the *Clinical Data Model Configuration* application.
3. Open the configuration you want to apply or create a new configuration.

   When you create a new configuration the *Genome Sequencing* interaction and the *Genetic Variant* interaction are created automatically under *Defined Interactions*.
4. If you want to edit the default details of these interactions, under *Defined Interactions*, choose one of these interactions and edit the available parameters and attributes.

   > → Recommendation
   >
   > We recommend you don't delete the standard attributes.
5. Open the *Patient Analytics Configuration* application.
6. Specify the clinical data model configuration containing the *Genome Sequencing* and *Genetic Variant* interactions.
7. Select an existing configuration or create a new configuration.
8. Under *Filter Cards*, turn the toggle switch for the *Genome Sequencing* and *Genetic Variant* interactions to *ON*.

9. For each interaction, specify the attributes you want to use.

> **i Note**
>
> You must, at a minimum, make *Location* visible for *Genetic Variant* and *Sample ID* for *Genome Sequencing*.

10. Under *Charts* > *Chart Types* , ensure the toggle switch for the *Genomic Views* is switched to *ON* and specify the reference genome you want to apply.

Results

In *Patient Analytics*, users can now use the *Genomic Views*, view genome sequencing information in the *Variant Browser*, and search by genetic variants using the *Genetic Variant* filter card. This is assuming the patients have genomic data available and this application configuration is assigned to the user.

4 Security

As SAP Medical Research Insights is an application running on SAP Connected Health, most security aspects are handled by the platform.

This guide complements the security information provided for SAP Connected Health with information about aspects specific to SAP Medical Research Insights. For information about general security tasks, such as securing network communication or creating users, see the SAP Connected Health Platform Administration Guide.

Related Information

Configuring a Minimum Patient Count [page 32]
Authorizations [page 34]
Logging Read Access and Changes to Patient Data [page 36]
Reporting on Patient Data [page 37]
Viewing and Deleting User Data [page 38]
Deleting Patient Data [page 38]
Blocking Access to Administrative Applications [page 39]
Regenerating Keypairs for SAP HANA XS Advanced [page 39]
SAP Connected Health Platform Security Guide

4.1 Configuring a Minimum Patient Count

To protect the privacy of the patients, you can configure a minimum patient count for the aggregated data displayed in the charts of *Patient Analytics*.

Context

In *Patient Analytics*, users view only aggregated patient data in the charts. To view specific patients, users must open the patient list, which does not show any patients for whom the user doesn't have permissions. However, if the number of patients used to generate the aggregated data is sufficiently small, a user could correctly guess which data belongs to which patient. To make sure that users can't identify individual patients in the charts, you can specify a minimum patient count that will allow users to drill down into patient data far enough to fulfill their research requirements without being able to interpret, with any accuracy, which patient the data may belong to.

The configured minimum patient count has the following effects:

- The charts in *Patient Analytics* display groups of patients that match combinations of values for the selected filter attributes. If a group of patients is smaller than the configured minimum patient count, this group isn't displayed.
- Only groups of patients bigger than the minimum patient count are displayed in the charts.
- Users can't see why a possible combination of values for the filter attributes is not displayed. The reason for this could be that either fewer patients than the minimum patient count have matching values or there's simply no data available.
- This threshold is also used to restrict values displayed in a filter card dropdown for catalog attributes. If the *Show All Codes* option is not selected for a catalog attribute on the *Filter Cards* tab, data is retrieved from the patient table. If the number of aggregated patients for a filter card dropdown entry is below the threshold, these entries are not displayed for selection. This prevents users from being able to identify individual patients.

> **i Note**
>
> The minimum patient count applies only to the chart views. It doesn't have an effect on the patient list.
>
> It's possible that you can see patients who match you filter attributes in the patient list, while, due to the configured minimum patient count, these patients don't appear in the chart views. You can see the patients in the patient list because they are patients who you are authorized to see.
>
> > **i Note**
> >
> > For security reasons, you should not set the minimum patient count to a value less than the value specified to trigger the requirement to use read access logging.

> **→ Tip**
>
> A minimum patient count isn't necessary if all users who work with the same *Patient Analytics* configuration are authorized to access the data of all patients in the patient list. In this case, you should specify a minimum patient count of 1 patient in the *Patient Analytics* configuration to allow an exact analysis of the data.

Procedure

1. Go to the SAP Fiori launchpad for SAP Connected Health.

   The SAP Fiori launchpad is available at the following URL: `https://<WebServerHost>:43<SAPHANAinstance>/sap/hc/hph`
2. Launch the *Patient Analytics Configuration* application.
3. Select the data model configuration and the Patient Analytics configuration you want to configure.
4. Open the *Charts* tab.
5. Specify the minimum patient count for the charts.
6. To save the settings, activate the configuration.

4.2 Authorizations

The authorization concept for SAP Medical Research Insights, which is an application that runs on SAP Connected Health, is that application authorization is granted using user roles and authorization logic for database access is incorporated into database views.

Related Information

User Roles [page 34]
Technical Role [page 35]
Analytic Privileges [page 36]

4.2.1 User Roles

SAP Medical Research Insights provides user roles for application users and administrators.

Users of SAP Medical Research Insights can have the following user roles:

Business Role	Technical Name	Description
SAP Medical Research Insights - Clinician	HC_MRI_APP_CLINICIAN	This user role is intended for end users of *Patient Analytics*. The CLINICIAN role grants access to *Patient Analytics* as well as to all end-user applications of SAP Connected Health, such as *Cohorts*, *My Profile*, and *Patient Summary*. This user role can do the following: • Use the filters in *Patient Analytics* • View aggregated patient data in the charts and visualizations of *Patient Analytics* • View patients in the patient list and view information on these patients in the *Patient Summary* • Create cohorts and use cohorts for filtering This user role can't configure the application.

Business Role	Technical Name	Description
SAP Medical Research Insights - Administrator	HC_MRI_APP_ADMIN	This user role is intended for administrators who configure the *Patient Analytics* application. This role grants access to the following administrative and configuration applications: • *Patient Analytics Configuration* • *User Management* application of SAP Connected Health **i Note** This user role doesn't grant access to the *Patient Analytics* application. For access to *Patient Analytics*, you need the CLINICIAN user role.

Assigning User Roles for SAP Medical Research Insights

Before you can assign user roles for SAP Medical Research Insights, you need to ensure that the *SAP Medical Research Insights Roles Plug-In* has been activated. You can do this in the *Plug-In Cockpit* of SAP Connected Health.

To assign a user role to a user, create or edit the user in the *Users* view of the *User Management* application of SAP Connected Health, and select the user role.

4.2.2 Technical Role

For applications running on SAP Connected Health, application users can't directly query the database. Instead, such queries are executed indirectly by a technical user.

For the technical user to connect to the database, you must assign it the technical role `sap.hc.mri.roles::HC_MRI_TECH_CONNECTION.hdbrole`.

In addition, in the SAP HANA XS Administration Tool, you must configure the SQL connection `sap.hc.mri::TechnicalConnection.xssqlcc`.

For more information, see *Setting up the Technical User* in the SAP Connected Health Platform Administration Guide.

4.2.3 Analytic Privileges

Restricting access to specific data and data types is critical when dealing with any form of patient data. By default, the security logic for SAP Connected Health is incorporated into database views. Analytic privileges are not supported by default.

If you already use custom analytic privileges, you can configure the system to use them. However, as soon as possible, you should adopt the approach of incorporating security logic into database views.

For more information, please contact your SAP technical consultant.

> → Recommendation
>
> We recommend that you use the provided default security logic. If you want to adjust the logic in any way, we recommend developing and implementing custom views.

For more information about implementing custom views, see *Customizing Data Consumption for Applications* in the SAP Connected Health Platform Administration Guide.

4.3 Logging Read Access and Changes to Patient Data

For security reasons, we recommend you log read access and changes to all tables containing sensitive data by using both the audit log framework of SAP Connected Health platform and SAP HANA audit policies.

Read-Access Logging

Most features of SAP Medical Research Insights aggregate patient data and therefore don't need to log read-access. However, the patient list feature does enable users to view individual patients and their data. For genomics features, you define a threshold that specifies when read-access logs are to be generated for genomic data that is accessed. These logs are only generated when your defined threshold is not met.

For this reason, we recommend enabling read-access logging for SAP Medical Research Insights using the audit log framework of SAP Connected Health platform.

For more information about the audit log framework and what information is logged for the patient list and genomics features, see the Security Guide of SAP Connected Health platform.

Audit Policies

For SAP Medical Research Insights, the table `"SAP_HPH"."sap.hc.mri.pa.db::MRIEntities.Bookmarks"` contains user data and, therefore, you must create an audit policy for it. The audit policy logs any changes made to this table.

All other tables containing patient and configuration data are included as part of SAP Connected Health.

4.4 Reporting on Patient Data

If you are required to show a patient what personal data is stored in the system, you can generate a technical report on all data stored for the patient or you can display the data in the *Patient Summary* application.

Technical Report

A service is available to generate a technical report as a JSON array, listing all data available in the system for a specified patient.

To use this service, you must be assigned the following roles:

- `sap.hc.hph.roles::HC_HPH_APP_PLATFORM_ADMIN`
- `sap.hc.hph.cdw.patientdeletion.roles::HC_HPH_CDW_PD_APP_ADMIN`

To generate a report, proceed as follows:

1. In SAP HANA studio or Web IDE, open the table `sap.hc.hph.cdw.db.models::DWEntities.Patient_Key` and use the information you know about the patient, such as the first and last name, to search the table for the `PatientID` and `DWSource` of the patient.
2. Log on to SAP Connected Health platform.
3. In your browser, open the following URL, making sure to include the `DWSource` and `PatientID`: `http://<host>:<port>/sap/hc/hph/cdw/patientdeletion/services/patientaccess.xsjs?DWSource=<DWSource>&PatientID=<PatientID>`

Patient Summary

As a more visual alternative, you can show a patient what data is stored by viewing the data on either the *Timeline* or the *Overview* of the *Patient Summary* application. These views show the different types of interactions the patient has had and the details of those interactions.

> **i Note**
>
> Your clinical data model configuration and patient summary configuration influence what patient data is shown in the *Patient Summary* application. If you are required to show all personal data to a patient, make sure that your configurations enable this by not filtering out or hiding relevant data.

4.5 Viewing and Deleting User Data

Context

In exceptional cases, you may need to delete the data associated with a specific user. For SAP Medical Research Insights, user data is stored for bookmarks. Bookmarks are specific to the user who created them and, therefore, include references to the user.

> **i** Note
>
> SAP Medical Research Insights users are created and stored as SAP HANA database users. Deleting bookmark information from SAP Medical Research Insights does not delete the user or other related user data from the SAP HANA database.

Procedure

1. To see where a user's bookmark data appears in the system, in the repository workspace, execute the stored procedure `"SAP_HPH"."sap.hc.mri.pa.db::MRIUserDisplay"`.

   When executing the procedure, use the `UserName` parameter to specify the user.
2. To delete the user's bookmark data, in the repository workspace, execute the stored procedure `"SAP_HPH"."sap.hc.mri.pa.db::MRIUserCleanup"`.

   When executing the procedure, use the `UserName` parameter to specify the user.

4.6 Deleting Patient Data

Although you view your patient data in SAP Medical Research Insights, the patient data is actually stored in SAP Connected Health. So if you need to delete patient data, you must do it from SAP Connected Health.

Related Information

Deleting Patient Data - SAP Connected Health

4.7 Blocking Access to Administrative Applications

If you've deployed the applications of SAP Medical Research Insights as Web-based applications, we strongly recommend setting up a firewall to restrict access to all administrative functions.

In your firewall settings, the following URLs must be accessible by end-users:

```
/sap/hc/mri/pa/ui/*
/sap/hc/mri/pa/services/*
```

> → Remember
>
> For a list of URLs that must be whitelisted for SAP Connected Health, see the *SAP Connected Health Security Guide*.

Related Information

Blocking Access to Administrative Applications

4.8 Regenerating Keypairs for SAP HANA XS Advanced

Context

If you believe that the keypair required for communication between SAP HANA XS classic and SAP HANA XS advanced has been compromised or if you need to regenerate a new keypair to comply with your organization's security policy, follow the steps described here.

Procedure

1. Log on as the SYSTEM user to the SAP HANA Web IDE, which is available at http://`<hostname>:43<instance number>/sap/hana/ide/editor`.
2. Navigate to the package *sap* > *hc* > *mri* > *lib*.
3. Right-click the file `xsa.xssecurestore` and choose *Delete*.
4. Right-click the same package lib and create a new file. Give the file the same name **`xsa.xssecurestore`**.
5. Open the file `xsa.xssecurestore`, enter **`{}`** in the file and save it.

6. Generate the key pair which is required for communication between SAP HANA XS classic and SAP HANA XS advanced.

   This step is described in Deploying SAP Medical Research Insights on SAP HANA XS Advanced [page 14].

7. Update the required back-end service by using the following command:

```
xs uups mridb-prod '{"host":"localhost","password":"<your password>","port":
3<instance
number>15,"schema":"SAP_HPH","user":"HPH_TECHNICAL_USER","pubKey":"<public
key>"}'
```

8. Restart the application using the command `xs restart mri`.

5 Operations

The SAP HANA Administration Guide provides relevant information about general operational concepts and tasks, such as monitoring, starting and stopping systems, or backup and recovery.

In addition to the operations features provided by the SAP HANA platform, SAP Connected Health provides a central *Clinical Data Warehouse Cockpit* application for monitoring data integration for the platform and its applications. For more information, see the SAP Connected Health Platform Administration Guide.

6 Troubleshooting

6.1 General Troubleshooting

If any problems or errors occur, you must ensure that the system is configured correctly according to the information presented in this guide.

If problems persist, you can contact SAP Support by going to https://support.sap.com/incident and creating an incident under the component `IS-PMED-MRI`.

6.2 Issues Deploying on SAP HANA XS Advanced

Issue	Suggested Action

Unknown errors occur and application deployment fails.	If deployment fails for unknown reasons, we recommend uninstalling the solu
	To do so, you can use the following commands in the command-line client:
	`xs uninstall XSAC_MRI_CORE`
	`xs install <SCA_zip_file_name>`
	Also make sure that the technical user isn't locked or disabled.

The required back-end service is created with the correct name but incorrect parameters.	Update the service using the `uups` command using the same parameters as
	You enter the command as follows:
	`xs uups mridb-prod '{"host":"localhost","password"`
	`xs restart mri`

The required back-end service is created with the incorrect name, that is, something other than `mridb-prod`.	We recommend deleting and re-creating the service.
	To do so, execute the following commands in the command-line client:
	`xs ds <incorrect name>`
	`xs cups mridb-prod '{"host":"localhost","password"`
	If the application has already been deployed, you must use the command `xs`
	If the application has not been deployed yet, you can simply proceed with the

Issue	Suggested Action
The error `Could not open app. Try again later.` appears when you try to open the Patient Analytics application.	This error can result from several causes. We recommend investigating the fo • The public key was incorrectly copied and pasted from your browser. • You used a port number in SAP HANA XS advanced other than the defau • The trust relationship between SAP HANA XS classic and SAP HANA XS • An MRI XSA error occurred during deployment or runtime. Please check • The SAP HANA XS advanced certificate has expired. You must follow cer
Too few logs are shown.	To view the recent logs of SAP Medical Research Insights, you use the comma

7 Glossary

Term	Definition
anonymization	A method of de-identifying a patient's document where information that can identify the patient is replaced with meaningless artificial identifiers. For example, a patient's birth date of 09/12/1984 could become XX/XX/XXXX.
attribute	Characteristic that describes a patient or an interaction. Attributes are displayed as fields on the filter cards of *Patient Analytics*. Attributes can be selected for the x-axis and y-axis of the *Patient Analytics* charts.
bin	Range of values defined by its bounds (upper bound and lower bound). On a chart, you can compress these value ranges on the x-axis to reduce the physical size of large charts and better visualize the presented information.
box plot chart	A chart that visualizes the distribution of numeric values by showing the median, the upper and lower quartiles as well as the maximum and minimum values.
catalog attribute	An attribute for which a set of possible values is defined. When an application uses this attribute, it can offer the user a list of all possible values defined
category	Subset of the patient population that meets your current filter criteria. Categories are visualized as columns and segments on a bar chart/stacked bar chart. Note that patients can be represented in more than one category.
censoring event	In a Kaplan-Meier survival curve, a censoring event is the date after which a patient whose vital status is undefined is censored from the number of survivors. This censoring event is the date of the last known contact, which SAP Medical Research Insights defines as the most recent of the interactions verifying the vital status.
chart lane	A type of timeline lane within the Patient Summary application that plots information for the numerical value of an interaction attribute in a chart.
clinical data model	A data model that categorizes clinical data into the four entities patient, interaction, condition, and observation, and describes how the entities relate to each other.
concept	The basic entity of ontology services that represents an arbitrary entity in the medical domain, such as a disease, medication, body part, or therapeutic procedure.
confidence interval	Value range in which a parameter, which was estimated from samples, falls with a defined probability (the confidence level).

Term	Definition
data binning	The technique of grouping columns within a specified range to reduce the number of columns shown in the bar chart.
filter attribute	A characteristic that describes a patient, an interaction, or other clinical entity, and can be used to filter clinical data during search or analysis.
ICD code	A code that classifies a medical condition or other health problem based on the International Classification of Diseases (ICD). It is used in health and vital records by physicians, medical staff, and researchers, for example.
patient	An entity of the clinical data model that represents a person with a specific medical condition.
practitioner	A person who is engaged in the healthcare process and healthcare-related services as part of his or her formal responsibilities.
tile lane	A type of timeline lane within the Patient Summary application that displays information for patient interactions as tiles.
timeline	Tab page within the patient summary that provides a chronological graphical overview of all interactions in a patient's medical record.
timeline lane	Grouping of interactions by category on the patient timeline within the patient summary.
TNM classification	A notation system that describes the stage of a cancer with alphanumeric codes.
variant browser	A feature that visualizes genetic variants in genome samples and allows users to explore the genetic variants of patients.
filter card	Cards on the left side of the *Patient Analytics* screen that allow you to restrict data to your population of interest. Filter cards are specifically designed and configured for your organization.
gene alteration matrix	A feature that visualizes distinct genomic alterations across a set of samples. Each row within the matrix represents a gene and each column represents a sample ID.
gene summary	A feature that lists all genes for which there are gene variants in the patient set. Users can select genes of interest from this list to see visualizations of the relevant information for these specific genes.
Kaplan-Meier chart	A diagram that shows the survival curve of patient groups and provides insights into the life expectancy of patient cohorts.
masking	The process of replacing words in a document that identify a subject with misleading or nonsense information to prevent the reader from knowing what or who the subject is.

Term	Definition
number at risk	In a Kaplan-Meier survival curve, the number of patients at any point in the curve who are still alive and whose follow-up extends at least that far into the curve.
patient count	Refers to the number of patients who meet your filter criteria; however, the exact meaning varies from application to application. In chart views, the patient count number shows the total number of patients displayed in the chart. In the Variant Browser, the patient count is limited to the patients for whom genetic data exists in the system. The patient count in the patient list indicates the number of patients the user is authorized to view in the *Patient Summary* application.
patient list	Chart view within Patient Analytics that displays a list of patients that match the specified search criteria and can be used to view information on individual patients.
patient summary	Provides a chronological overview of the events contained in a single patient's medical record. Authorized users can open the patient summary from the patient list of *Patient Analytics*, or from a search result or cohort.
reference expression	An SQL expression specified for a catalog attribute in a clinical model configuration. It defines the source of information for that attribute.
reference filter	An SQL expression specified for a catalog attribute in a clinical data model configuration. It is used to select the correct reference catalog in a reference table.
survival curve	A line that indicates the survival rate of a patient group in the form of a graph that shows the percentage of the group still surviving at successive times for as long as information is available.
pseudonymization	A method of de-identifying a patient's document where information that can identify the patient is replaced with different information of the same type. For example, John Smith could become Frank Johnson.
basic data	Basic patient data attributes, such as date of birth, last name, and address, that you define in the clinical data model configuration by filtering and combining data from the tables of the clinical data warehouse. Usually, basic patient data is mapped to the patient entity of the clinical data model.
cohort	A group of patients with similar characteristics who you have identified, through either analysis or search, as being commonly relevant for research purposes. You can inspect, evaluate, and share cohorts with other users.
condition	A specific instance of a medical condition in a patient, such as cancerous tumors, allergies, mental health conditions, or hereditary diseases.
contributor	A person with whom a cohort is shared. Based on the type of contributor role assigned, this person can either read, edit, or administer the cohort.

Term	Definition
extension point	An integration point in the system where the standard functionality or feature can be extended by customers and partners. In other words, it is a schema-based contract API.
ideogram	A schematic representation of a chromosome. An ideogram shows the typical banding pattern of a chromosome. This banding pattern represents the cytogenetic bands and is used to localize individual genes on the chromosome.
interaction	An instance of any form of communication between a patient and the health care provider, such as a diagnosis, treatment, or letter. Interaction is the central entity of the clinical data model. You can model most clinically relevant events as interactions. An interaction may occur at a specific time or across a span of time.
key table	A database table containing the business key of a clinical data model entity, such as patient or interaction. The business key of an entity is stable and defines the entity and its relation to the other entities.
measure	Numeric attribute used to calculate the value of each category. A standard measure to use is the patient count, and the column height represents the number of patients that fall within each category.
observation	A record of a time-specific observation or measurement for a patient, such as blood measurement or tumor sizing from a scan, which may or may not relate to a specific interaction or condition.
organizational unit	A specific unit or department in an organization that users are assigned to. Organizational units can be grouped and placed in hierarchical structures.
plug-in	A plug-in is a collection of one or more extensions to the SAP Connected Health platform, similar to OSGI bundle. A plug-in can be a completely different SAP HANA XS application and at the same time contribute to the platform.
track	A given sequence or property of a genome, such as variant density, visualized across a horizontal line.

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