**ImmPort Contract** 

# **SYSTEM ARCHITECTURE AND SOFTWARE DESIGN SPECIFICATION**



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> Project Sponsor: National Institutes of Health (NIH) National Institute of Allergy and Infectious Diseases (NIAID) Division of Allergy, Immunology, and Transplantation (DAIT)



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System Architecture and Software Design Specification

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# 1. INTRODUCTION

# 1.1. SCOPE

The scope of the ImmPort contract is to provide advanced information technology support in the production, analysis, archiving, and exchange of scientific data for a diverse community of life science researchers.

# 1.2. PURPOSE

The Immunology Database and Analysis Portal (ImmPort) applications are being developed by a Peraton-led team. Previous development was performed by the same team under Northrop Grumman Information Systems (NGIS) with academic partners from the University of California San Francisco in the current contract (phase 2 and 3) and the University of Texas-Southwestern in the prior phase 1 contract. The ImmPort system is intended to serve as a long-term, sustainable archive of data generated by investigators funded through the Division of Allergy, Immunology, and Transplantation (DAIT) of the National Institute of Allergy and Infectious Disease (NIAID), National Institutes of Health (NIH). The ImmPort system consists of an extensive data warehouse containing an integration of experimental and clinical data supplied by NIAID/DAIT-funded investigators. The ImmPort system is freely accessible as a resource to all scientists in the research community.

This System Architecture and Software Design Specification (SASDS) defines the overall ImmPort architecture and software design specification identified by the Peraton ImmPort Team (hereinafter referred to as the ImmPort Team) for the ImmPort system developed for NIAID/DAIT. The architecture and design described in this document focus on the capabilities that are implemented in the ImmPort family of applications as of June 30, 2021.

# 1.3. BACKGROUND

The key objective of the SASDS version 6.0 is to provide an update to the hardware and software specifications of the system. The ImmPort project has evolved, such that systems are now hosted in a production or near-production mode at both the NIAID hosting facility as well as Amazon Web Services (AWS) cloud environment. In general, the long-term goal, which is in progress, is to provide hosting of data while it is private and being QC'ed and curated in ImmPort related applications housed at the NIAID hosting facility. When data is shared with the general scientific community, data would be transferred to AWS for easier re-use of these data for analysis, or in short, to bring the data to the analysis tool. This bifurcation of systems allows ImmPort and NIAID staff to maintain maximum control over data while it is shared in AWS.

The ImmPort contract includes a shift in focus to lessen the level of effort spent on the development, maintenance, and outreach for analysis tools and reference data capabilities. The FLOCK flow analysis tool suite continued to have constant usage and increased interest and publications related to tool usage and results, so the decision was made to continue support of that application. As a result of these decisions, the retired tools and queries will not appear in this design document.

For the remaining features of ImmPort, it was recognized a general code refresh was necessary given the overall age of the software and supporting stack of frameworks. As a result, the ImmPort team progressed incrementally through the upgrade of features into a new software architecture detailed in this document. For the purposes of this document, newer code architecture is referred to as "ImmPort 3.0", while the prior architecture being gradually replaced is referred to as "ImmPort 2.0". This document will detail the ImmPort 3.0 architecture for features that have been upgraded or will soon be upgraded and will keep the existing documentation in place for ImmPort 2.0 features not yet upgraded in the production environment. As features are completed, this document will be accordingly updated. The functional requirements documents for features in progress for the upgrade will also be available and referenced in this document.

Compared to prior versions of this document that detailed ImmPort 2.0 architecture, the overall system architecture for ImmPort 3.0 is being simplified to have a less dense middle-tier. As a result, the need to document detailed design packages in this SASDS is reduced, since the same middle-tier approach is utilized across the features in a given application and the EJB tier has been removed.

The database documentation has been moved online, so is no longer described in detail in this document. References to the freely available online materials will be provided in this document. Far more detail about the database fields, tables, and ERD diagrams are available online than in prior versions of the SASDS, so the overall amount of information has increased markedly. Additionally, since the SASDS document was released the entire database in MySQL is available for anyone to download and re-use, making comprehension of the database architecture much simpler.

This document is to be considered a "work in progress" and will evolve during the life of the ImmPort effort as additional requirements are implemented, new requirements are identified, and others are modified or deleted.

# 2. IMMPORT TOOLS ON AMAZON WEB SERVICES

The ImmPort tools deployed on Amazon Web Services (AWS) are designed primarily to

- 1. Identify studies of interest for users to evaluate for future analysis. The application performing this feature is ImmPort Shared Data.
- 2. Download studies of interest. The application performing this feature is ImmPort Data Browser.
- 3. Provide a unified platform for several ImmPort resources such as documentation, tutorials, upload templates, example packages, blogs. The application performing this feature is ImmPort Portal.

In addition to the above applications, the AWS infrastructure is utilized to develop Alpha and Beta tools to obtain feedback on utility from the user community. Tools such as ImmuneXpresso and the Cell Ontology browser fit into this category. Finally, the AWS infrastructure is being used to host production applications developed by other research teams funded by DAIT without the funding to support a federal system. ImmuneSpace is the first example of this usage of ImmPort resources.

# 2.1. DATABASE ARCHITECTURE

# 2.1.1. OVERVIEW

Currently ImmPort has 3 databases instantiated in the production environment, 2 use Aurora MySQL databases, and the third (Ontology) uses a local MySQL installed on an Ubuntu server. The plan is to move the Ontology database to the Aurora MySQL in the next year.

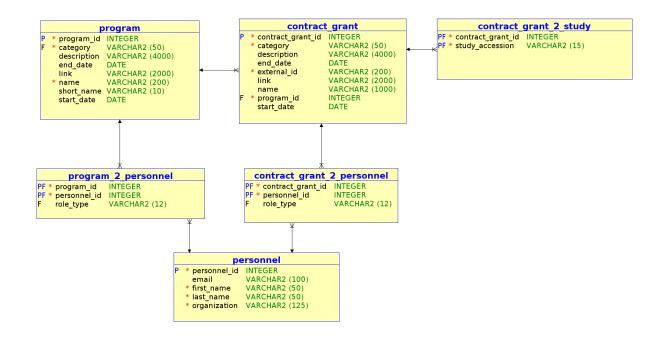
- 1. Shared Data read-only, data that has been shared to the public
- 2. Metric read/write metric from the various applications is logged to this database
- 3. Ontology read-only, contains data to support the Cell Ontology browser

# 2.1.2. Shared Data

The Shared\_Data database contains all the data shared for public access as part of the Data Release process. The Data Release process occurs approximately 4 to 6 times per year. Between releases, data remains static and accessed primarily using read-only api. With each release, we create a new database, named DRXX\_SHARED\_DATA, and at the time of the Data Release, the connection string for the applications is updated to use the new version of the Shared\_Data database.

# 2.1.2.1. Administrative

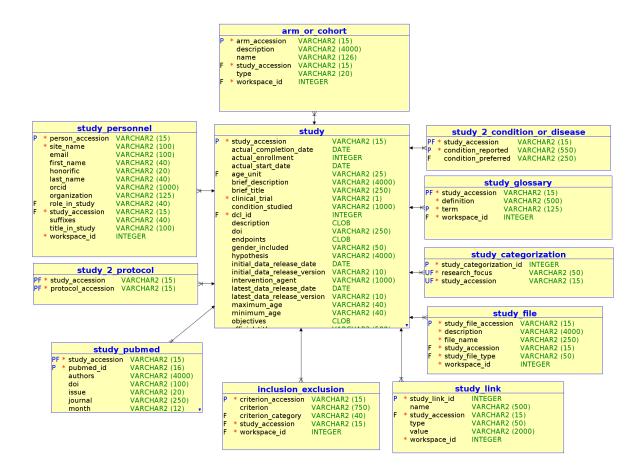
This diagram represents the tables used to capture Program and Contract information. Several contracts can be linked to one Program and one or more studies can be linked to each contract.



## 2.1.2.2. Study

This diagram represents information for the overall design of the **study**. The **arm\_or\_cohort** table is used to link studies to subjects using the **arm\_2\_subject table**. The **study\_file** table is used to link various types of files, uploaded by data providers, where the file contents may or may not be structured. Examples of file types uploaded are Case Report forms, generic study data, lab results, assessments, etc. Some of these files may be parsed and loaded into tables like assessment/assessment\_component and lab\_test\_panel/lab\_test. Assay result files are not normally loaded into the **study\_file** table but are stored in the **file info** table and usually associated with an **expsample** record. The

**study\_2\_condtion\_or\_disease** table supports associating one or more conditions/diseases to a study. The terms for the conditions/diseases are in the **lk\_disease** table, which uses the Disease Ontology and Human Phenotype Ontology, as the source for the terms. The **study\_categorization** table provides a method to link a **study** to broad research focus areas. Examples of research focus areas are Immune Response, Vaccine Response, Transplantation, etc.

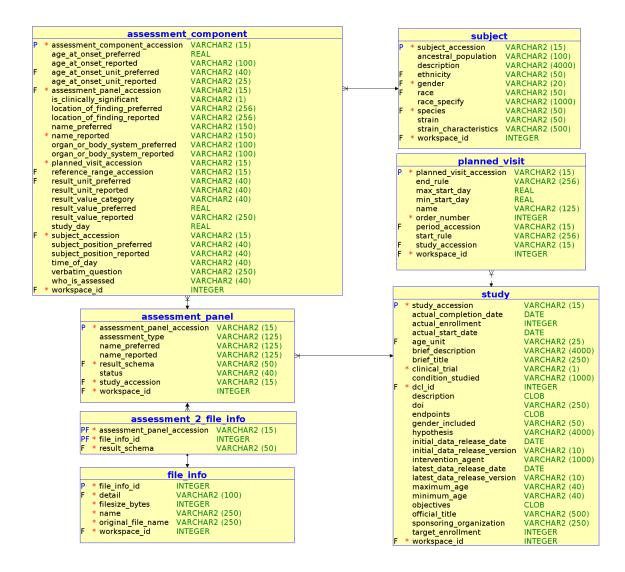


These tables contain subject-level information. A subject may be linked to one or more studies via the **arm\_2\_subject** table. The **arm\_2\_subject** allows the data model to capture the age of the subject at the time of each study. This is important when individual studies are part of a larger longitudinal study and the time frame can span several years. The **biosample** table represents the material obtained from the subject at a specific point in time. For example, if the protocol called for obtaining a blood sample on Day1, Day 7, and Day28, there would be 3 biosample records for each **subject**.

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	name preferred	VARCHAR2 (150						duration unit	VARCHAR2 (10)
1	name_reported	VARCHAR2 (150		۲ ۴	adverse_event_accession	VARCHAR2		end day	VARCHAR2 (40)
	organ or body system preferre				causality	VARCHAR2		end time	VARCHAR2 (40)
	organ or body system reported				description	VARCHAR2	(4000)	formulation	VARCHAR2 (125)
1	planned visit accession	VARCHAR2 (15)			end_study_day	REAL		is ongoing	VARCHAR2 (123)
	reference range accession	VARCHAR2 (15)			end_time	VARCHAR2 (		name preferred	VARCHAR2 (40)
	result_unit_preferred	VARCHAR2 (40)			location_of_reaction_prefe				
	result unit reported	VARCHAR2 (40)			location_of_reaction_repo			* name_reported reported indication	VARCHAR2 (125)
	result value category	VARCHAR2 (40)			name_preferred	VARCHAR2 (			VARCHAR2 (255)
	result value preferred	REAL			name_reported	VARCHAR2 (		route_of_admin_preferred	
	result_value_reported	VARCHAR2 (250			organ_or_body_system_p			route_of_admin_reported	VARCHAR2 (40)
	study day	REAL			organ_or_body_system_re			start_day	VARCHAR2 (40)
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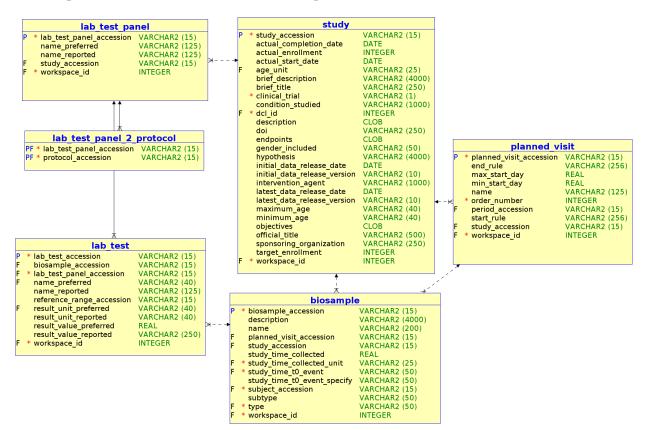
## 2.1.2.4. Assessment

Individual **assessment\_component** records can be grouped together as a unit, using the **assessment\_panel** record. For example, an **assessment\_panel** record may represent a questionnaire filled out by a subject, and each of the 20 questions on the questionnaire is represented by 20 assessment\_component records. **Subject** records are linked directly to **assessment\_component** records, which is different from **biosample** records which are linked to **lab\_test** records. The reason **subject** records are linked directly to an assessment can occur without a biological specimen being collected, for example when filling out a questionnaire. **Assessment\_component** records are linked to a **planned\_visit** record, and the **planned\_visit** record captures the temporal aspects of when the assessments were made.



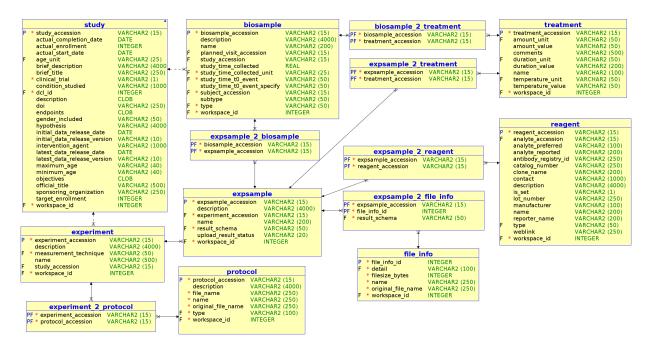
## 2.1.2.5. Lab Test

Individual **lab\_test** records can be grouped as a unit using the **lab\_test\_panel** record. For example, a **lab\_test\_panel** record may represent a group of chemistry tests made on a single blood sample and each of the 10 tests that make up the chemistry test panel are represented by 10 lab\_test records. **Biosample** records are linked directly to **lab\_test** records. The **biosample** records are also linked to a **planned\_visit** record, and the **planned\_visit** record captures the temporal aspects of when the **biosample** was obtained and when lab tests were performed.



## 2.1.2.6. Experiment

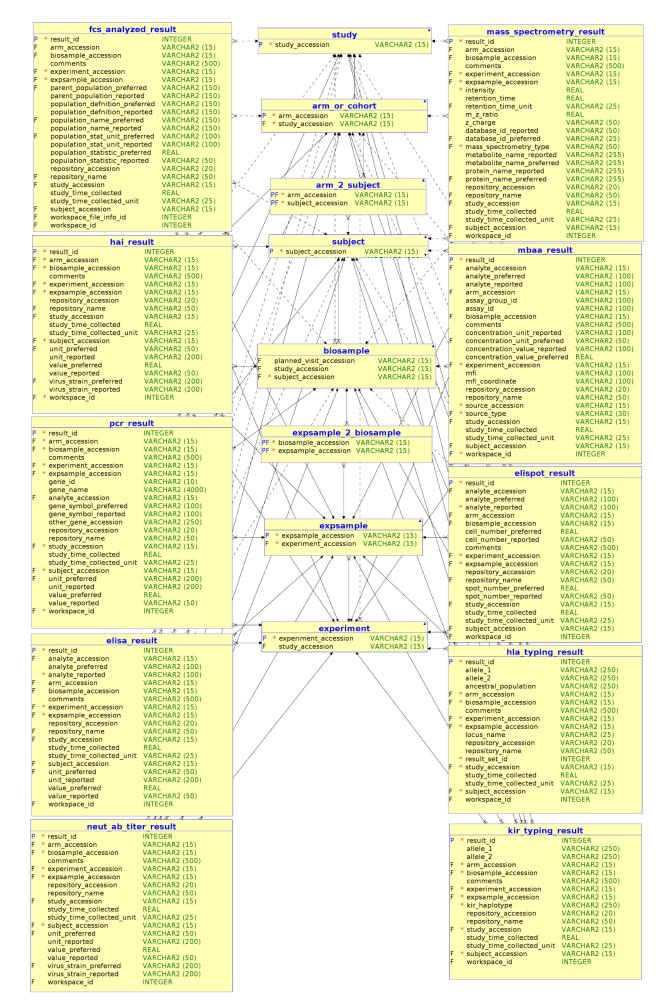
The **experiment** table represents assays performed using multiple **expsample** records. Types of assay methods (measurement\_techique) are ELISA, ELISPOT, PCR, Flow Cytometry, etc. The **expsample** record is obtained from the **biosample** record, in some experiments, the original **biosample** may have been divided into multiple **expsamples**, with each **expsample** used for a different assay method. If the original assay result file has been uploaded by the data provider, the **expsample** record is linked to the record in the **file\_info** table, via the **expsample\_2\_file\_info** table.



## 2.1.2.7. Assay Results

For common assay methods where result formats are fairly standardized the results are parsed into the result table for that assay method is supplied by the data provider. In the Shared\_Data schema, when this information is extracted from the production operational database, several properties are denormalized into these tables to make them easier to use in downstream analysis. In the production database, the base table normally has only the **experiment\_accession** and **expsample\_accession**.

#### System Architecture and Software Design Specification



## 2.1.2.8. Lookup Tables - Part 1

There are approximately 45 tables in the Shared\_Data schema that ImmPort identifies as lookup tables, but others may refer to them as controlled vocabulary tables. These tables are used to harmonize data from a study to study. For many of the base tables, ImmPort has both a reported\_name and a preferred\_name with the preferred name mapped to one of the lookup tables. In addition, several lookup tables are populated using terms from ontologies. Examples of the ontologies used are

- 1. Vaccine Ontology
- 2. Disease Ontology
- 3. Human Phenotype Ontology
- 4. Uberon Anatomy Ontology
- 5. Clinical Measurement Ontology
- 6. Cell Ontology
- 7. Protein Ontology
- 8. Gene Ontology
- 9. IPD-IMGT/HLA
- 10. NCBI Taxonomy
- 11. Ontology Biomedical Investigation

System	Architecture	and	Software	Design
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	gene_symbol	VARCHAR2 (100)			
	gene_aliases	CLOB			
	gene_id	VARCHAR2 (10)			
	genetic_nomenclature_id	VARCHAR2 (100)			
	immunology_symbol	VARCHAR2 (100)			
	link official gene name	VARCHAR2 (2000) VARCHAR2 (255)			
	protein ontology id	VARCHAR2 (255) VARCHAR2 (15)			
	protein_ontology_name	VARCHAR2 (13)			
	protein_ontology_synonyms	CLOB			
	protein_ontology_short_label	VARCHAR2 (255)			
	taxonomy id	VARCHAR2 (10)			
	uniprot entry	VARCHAR2 (20)			
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description VARCHA	AR2 (1000)
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* name	VARCHAR2 (50)
cdisc lab test code	
description	VARCHAR2 (1000)
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IIFIK	VARCHARZ (2000)
lk_lab_test_p	anel_name
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* description link	VARCHAR2 (1000) VARCHAR2 (2000)
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lk_exposur	e_process
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	AR2 (1000)
link VARCH4	AR2 (2000)
lk_expsample_r	esult_schema
* name VARCH4	AR2 (50)
description VARCHA	
* table_name_VARCH/	AR2 (30)

		lk gender
Ρ	* name	VARCHAR2 (20)
	description	VARCHAR2 (1000)
	link	VARCHAR2 (2000)
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Ρ	* name	VARCHAR2 (100)
	description	VARCHAR2 (1000)
	link	VARCHAR2 (2000)
		lk_hmdb
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	<u>lk_mass</u>	spectrometry_type
Ρ	* name	VARCHAR2 (50)
	description	VARCHAR2 (4000)
	link	VARCHAR2 (2000)
	lk	organization
p		CHAR2 (125)
		CHAR2 (2000)
		. ,
	ا بال	oersonnel role
P	* name	VARCHAR2 (40)
	description	VARCHAR2 (1000)
	link	VARCHAR2 (2000)
_	п.	
p		protein_name
Ρ	* name * uniprot id	VARCHAR2 (255) VARCHAR2 (50)
	uniprot_gen	
	description	VARCHAR2 (4000)
	link	VARCHAR2 (2000)
_		culate true
P		c_plate_type
Ρ	* name description	VARCHAR2 (50) VARCHAR2 (1000)
	link	VARCHAR2 (2000)
		protocol_type
Ρ	* name	VARCHAR2 (100)
	description	VARCHAR2 (1000)
	link	VARCHAR2 (2000)
	lk_pı	ublic_repository
Р	* name	VARCHAR2 (50)
	description	VARCHAR2 (1000)
	link	VARCHAR2 (2000)

# 2.1.2.9. Lookup Tables - Part 2

_		
		lk_race
Ρ	* name	VARCHAR2 (50)
	description	VARCHAR2 (1000)
	link	VARCHAR2 (2000)
_	IIIIX	
	<u> </u>	eagent_type
Ρ	* name	VARCHAR2 (50)
	description	VARCHAR2 (1000)
	link	VARCHAR2 (2000)
_		. ,
	lk re	esearch focus
Р		VARCHAR2 (50)
Ľ		VARCHAR2 (1000)
	link	VARCHAR2 (2000)
	IIIIK	VARCHARZ (2000)
		sample_type
Ρ	* name	VARCHAR2 (50)
	description	VARCHAR2 (1000)
	link	VARCHAR2 (2000)
_		
	Ik_	source_type
Ρ	* name	VARCHAR2 (30)
	description	VARCHAR2 (1000)
	link	VARCHAR2 (2000)
		k_species
Ρ	* name	VARCHAR2 (30)
	common_na	
	link	VARCHAR2 (2000)
	* taxonomy_ic	VARCHAR2 (10)
	* taxonomy_ic	_subset VARCHAR2 (10)
		-

	lk :	study panel
Ρ	* name	VARCHAR2 (100)
	collapsible	VARCHAR2 (1)
		VARCHAR2 (1000)
		e VARCHAR2 (100)
	sort_order	INTEGER
	visible	VARCHAR2 (1)
_		udy_file_type
Ρ	* name	VARCHAR2 (50)
		VARCHAR2 (1000)
	link	VARCHAR2 (2000)
	lk su	bject location
Ρ	* name	VARCHAR2 (50)
	* description	VARCHAR2 (1000)
	link	VARCHAR2 (2000)
		c t0 event
Р	* name	VARCHAR2 (50)
٢.		VARCHAR2 (50) VARCHAR2 (1000)
	link	VARCHAR2 (2000)
	IIIIK	VARCHARZ (2000)
		c time unit
Ρ	* name	VARCHAR2 (25)
		VARCHAR2 (1000)
	link	VARCHAR2 (2000)
		. , , , , , , , , , , , , , , , , , , ,

	lk	transcript_t	уре
Ρ	* name	VARCHAR2 (50	
		VARCHAR2 (10	
	link	VARCHAR2 (20	00)
		<u>unit_of_mea</u>	
Ρ	* name	VARCHAR2 (50	
		VARCHAR2 (10	
	link	VARCHAR2 (20	
	* type	VARCHAR2 (50	)
	IL	user role t	vne
P		VARCHAR2 (2)	ype
٢	* name	VARCHAR2 (2)	00)
	description	VARCHARZ (10	00)
	lk v	isibility cate	egory
Р	* name	VARCHAR2 (50	)
	description	VARCHAR2 (10	00)
_			
		lk_virus_stra	in
Ρ	* name		VARCHAR2 (200)
		ame_season_list	
	description		VARCHAR2 (1000
	link		VARCHAR2 (2000
	season_list		VARCHAR2 (100)
	* taxonomy_id	1	INTEGER
	virus_name		VARCHAR2 (10)

# 2.1.3. Metric

# 2.1.3.1. Metric

class_nameVARCHAR2 (255)created_byVARCHAR2 (255)date_createdDATEdurationINTEGERend_pointVARCHAR2 (255)end_timeDATEmethod_nameVARCHAR2 (255)organizationVARCHAR2 (255)organizationVARCHAR2 (255)guery_paramsCLOBremote_ip_addressVARCHAR2 (255)start_timeDATEusernameVARCHAR2 (255)date_createdDATEapplication_nameVARCHAR2 (255)date_createdDATEmetric_idINTEGERapplication_nameVARCHAR2 (255)date_createdDATEmetric_typeVARCHAR2 (255)date_createdDATEend_pointVARCHAR2 (255)guerVARCHAR2 (255)metric_typeVARCHAR2 (255)organizationVARCHAR2 (255)metric_typeVARCHAR2 (255)organizationVARCHAR2 (255)metric_typeVARCHAR2 (255)organizationVARCHAR2 (					
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DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR ORGANIZATION VARCHAR	* metric_id application_name created_by date_created end_point metric_type ng_user organization parameters remote_ip_address start_time	INTEGER VARCHAR2 (255) VARCHAR2 (255) DATE VARCHAR2 (255) VARCHAR2 (255) VARCHAR2 (255) VARCHAR2 (255) CLOB VARCHAR2 (255) DATE		P * USER_SESSION_ID CLASS_NAME DURATION END_TIME METHOD_NAME QUERY_PARAMS REMOTE_IP SESSION_ACTIVITY_CO SESSION_ACTIVITY_CO SESSION_DATE START_TIME USER_LOGIN_NAME	INTEGER VARCHAR2 INTEGER DATE VARCHAR2 CLOB VARCHAR2 DATE DATE VARCHAR2 VARCHAR2
LAST_UPDATED_BY VARCHAR ORGANIZATION VARCHAR	* metric_id application_name created_by date_created end_point metric_type ng_user organization parameters remote_ip_address start_time	INTEGER VARCHAR2 (255) VARCHAR2 (255) DATE VARCHAR2 (255) VARCHAR2 (255) VARCHAR2 (255) VARCHAR2 (255) CLOB VARCHAR2 (255) DATE		P * USER_SESSION_ID CLASS_NAME DURATION END_TIME METHOD_NAME QUERY_PARAMS REMOTE_IP SESSION_ACTIVITY_CO SESSION_DATE START_TIME USER_LOGIN_NAME DATE_CREATED	INTEGER VARCHAR2 INTEGER DATE VARCHAR2 CLOB VARCHAR2 DATE DATE VARCHAR2 DATE VARCHAR2 DATE
ORGĀNIZATION VARCHAR	* metric_id application_name created_by date_created end_point metric_type ng_user organization parameters remote_ip_address start_time	INTEGER VARCHAR2 (255) VARCHAR2 (255) DATE VARCHAR2 (255) VARCHAR2 (255) VARCHAR2 (255) VARCHAR2 (255) CLOB VARCHAR2 (255) DATE		P * USER_SESSION_ID CLASS_NAME DURATION END_TIME METHOD_NAME QUERY_PARAMS REMOTE_IP SESSION_ACTIVITY_CO SESSION_DATE START_TIME USER_LOGIN_NAME DATE_CREATED CREATED_BY	INTEGER VARCHAR2 INTEGER DATE VARCHAR2 CLOB VARCHAR2 DATE VARCHAR2 DATE VARCHAR2 DATE VARCHAR2
	* metric_id application_name created_by date_created end_point metric_type ng_user organization parameters remote_ip_address start_time	INTEGER VARCHAR2 (255) VARCHAR2 (255) DATE VARCHAR2 (255) VARCHAR2 (255) VARCHAR2 (255) VARCHAR2 (255) CLOB VARCHAR2 (255) DATE		P * USER_SESSION_ID CLASS_NAME DURATION END_TIME METHOD_NAME QUERY_PARAMS REMOTE_IP SESSION_ACTIVITY_CO SESSION_DATE START_TIME USER_LOGIN_NAME DATE_CREATED CREATED_BY DATE_LAST_UPDATED	INTEGER VARCHAR2 INTEGER DATE VARCHAR2 CLOB VARCHAR2 DATE DATE DATE VARCHAR2 DATE VARCHAR2 DATE VARCHAR2
	* metric_id application_name created_by date_created end_point metric_type ng_user organization parameters remote_ip_address start_time	INTEGER VARCHAR2 (255) VARCHAR2 (255) DATE VARCHAR2 (255) VARCHAR2 (255) VARCHAR2 (255) VARCHAR2 (255) CLOB VARCHAR2 (255) DATE		P * USER_SESSION_ID CLASS_NAME DURATION END_TIME METHOD_NAME QUERY_PARAMS REMOTE_IP SESSION_ACTIVITY_CO SESSION_DATE START_TIME USER_LOGIN_NAME DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	INTEGER VARCHAR2 INTEGER DATE VARCHAR2 CLOB VARCHAR2 DATE DATE VARCHAR2 DATE VARCHAR2 DATE VARCHAR2

# 2.1.4. Cell Ontology

The three tables in this database represent information parsed from the cl.obo file. The **cell\_term** table captures base information for all cell terms. The **cell\_synonym** table contains names used for a cell term. The information in **cell\_term** and **cell\_synomym** are merged and the content is indexed using ElasticSearch to support the search capability in the application and is displayed in cell detail pop-ups on hover in the application. The **cell\_graph** table supports the generation of the force-directed graph displayed in the application which shows the relationship between cell terms.

		Cents	synonym
VARCHAR2 (50) VARCHAR2 (255) VARCHAR2 (50) VARCHAR2 (4000) t VARCHAR2 (4000)	Ρ		INTEGER VARCHAR2 (20 VARCHAR2 (25 INTEGER
	t VARCHARZ (4000)	t VARCHAR2 (4000)	t VARCHAR2 (4000)

# **2.2. HOSTED APPLICATIONS**

# 2.2.1. ImmPort Shared Data

ImmPort Shared Data is the application utilized by researchers to identify studies of interest for further exploration and analysis. As of December 31, 2020, 462 studies have been shared and cataloged in ImmPort Shared Data. Currently, no row-level results are viewable from within ImmPort Shared Data with the advantage that no user authorization is required. Viewing row-level data would require authorization/user login. ImmPort Shared Data utilizes a standard suite of Linux-based AWS servers and components described below and a Spring/Java and Angular web application architecture.

## 2.2.1.1. Feature Summary

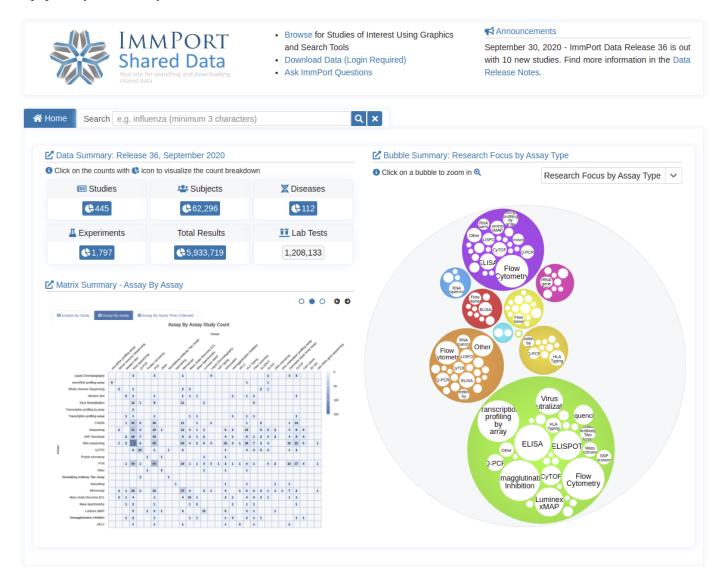
 Table 2.4.1.1-1 below summarizes the major functionality of ImmPort Shared Data.

#	Capabilities/Features	Capability/Feature Description
1	Search for Studies	Allows users to perform a "Google-like" search to identify shared studies of interest. Text entered by the user is searched against an index of the entire set of metadata stored in the ImmPort database.
2	View/Filter Query Results	After an initial search, users are presented with a list of studies, summary information about each study, and the search hits. From here users may use facets on the left-hand panel to further filter studies returned by categories of data such as assay method, species, sample type, etc.
3	View Study Details	Once a study of interest is identified, users are able to view extensive metadata and summary data about the study.
4	Visualize Summary Data	For selected aspects of the study data such as demographics, users are can filter and visualize data in standard plots such as bar charts by factors such as gender, ethnicity, and arm
5	Link to download data	For a given study, users can click to download the raw study data and are redirected to log in to the Data Browser application at NIAID.
6	View Reference and Static content	Static content such as tutorials, curated cytokine lists, system documentation, user documentation and ImmPort project information are hosted on the ImmPort Shared Data site.

#### Table 2.4.1.1-1: Summary of ImmPort Capabilities and Features

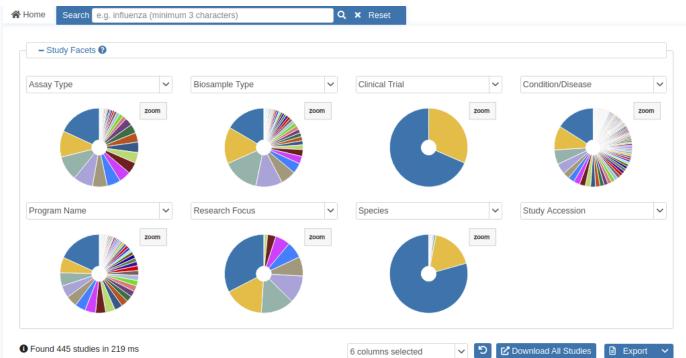
#### 2.2.1.1.1. Feature 1: Home Page

The ImmPort Shared Data home page provides the entry-point into ImmPort Shared Data. Beyond being an information page containing announcements and ImmPort background information, users can right away begin searching and filtering for studies of interest. In addition, studies that may be of interest to the user community are highlighted in the slider bar based on factors such as recent publications, the popularity of the study based on views or downloads, and recent additions to the shared ImmPort content.



#### 2.2.1.1.2. Feature 2: Search Bar and Results

Once the user has selected to view either all or a subset of studies a list of studies is presented as shown below. The page layout is a familiar design with faceted search capabilities illustrated in the left-hand panel, and a "Google-like" simple text search bar at the top. From this page, users may either select a study to view more details, filter the study list further based on facets, click to view a larger version of the study schematic graphic or click to download the study data. Clicking the Download button directs the user to the Data Browser application in the directory for that study after authentication.



		K < 1 2 3 4	5 🕨 🎽 10 🗡		SI	howing 1 to 10 of 44
0	Study 🗢	Title 🗢	Pubmed Id 🗢	Research Focus 🗢	Latest Release Version	Latest Release Date ♦
>	🕑 SDY1630 🛓	Effects of tissue localization on Natural Killer (NK) cell phenotypic and functional diversity	32059780		DR36	2020-09-30
>	🗹 SDY1648 🛓	Sex differences in immune responses to SARS- CoV-2 (Companion study to SDY1655)	32577695 32846427	Infection Response	DR36	2020-09-30
>	🗹 SDY1434 🛓	Steroid and Tacrolimus Avoidance Using NULOJIX (Belatacept) in Renal Transplantation (CTOT-16)	32558199		DR36	2020-09-30
>	🗹 SDY1640 🛓	T and B cell responses to SARS-CoV-2 coronavirus	32473127	Infection Response	DR36	2020-09-30
>	🗹 SDY1603 🛓	Investigating the natural killer cell response to acute dengue infection.		Immune Response	DR36	2020-09-30
>	ピ SDY1654 🛓	Single-cell transcriptomics of human T cells	31624246		DR36	2020-09-30
>	🗹 SDY1634 🛓	Charge-Altering Releasable Transporters Enable Specific Phenotypic Manipulation Of Resting Primarv Natural Killer Cells	32898247	Cell Biology	DR36	2020-09-30

### 2.2.1.1.3. Feature 3: Study Detail Page

When a study is selected, the user is presented with a study detail page. Within this page, there are multiple tabs presented with different aspects of study data based on what has been provided. The full set of tabs that may be displayed include

- Summary: title, description, PI, type, arms/cohorts, study schematic
- Study Design: study timeline, inclusion and exclusion criteria, schedule of events
- Adverse Event: summary of adverse event data by severity, name, arm
- Assessment: summary of assessments taken
- Interventions: summary of interventions performed
- Medications: concomitant medications taken
- Demographics: summary information about gender, age, ethnicity
- Lab Tests: summary of laboratory panels and tests
- Mechanistic Assays: summary of assays performed, protocols, platforms, reagents, treatments
- Study Files: catalog of study data files provided

#### SDY1630 - Effects of tissue localization on Natural Killer (NK) cell phenotypic and functional diversity

<ul> <li>Summary</li> </ul>				
Accession	SDY1630			
Title	Effects of tissue localization on Natural Killer (NK) cell phenotypic and functional diversity			
DOI	10.21430/M38FVNPEZC			
Brief Description	This study characterizes human Natural Killer (NK) cells across multiple lymphoid and mucosal tissues from individual organ donors using high- dimensional flow cytometry and whole transcriptome analysis.			
PI	Donna Farber - Columbia University			
Туре				
Condition Studied				
Start Date	2017-06-01			
Description the development and function of human Natural Killer (NK) cells, innate lymphocytes important for anti-viral and tumor immunity. Integrating high dimensional analysis of NK cells from blood, lymphoid organs, and mucosal tissue sites from 59 individuals, we identify tissue-specific patterns or cell subset distribution, maturation and function across age and between diverse individuals. Mature and terminally differentiated NK cells with enhanced effector function predominate in blood, bone marrow, spleen and lungs, exhibiting shared transcriptional programs across sites. By co precursor and immature NK cells with reduced effector capacity prevail in lymph nodes and intestines, exhibiting tissue-resident populations, while specific adaptations. Together, our results reveal anatomic control of NK cell development and maintenance as tissue-resident populations, while mature, terminally differentiated subsets mediate immunosurveillance through diverse peripheral sites.				
Objectives	Characterize tissue-specific compartmentalization and functional properties of NK cells			
Hypothesis	Tissue site shapes the phenotype, developmental state and functional potential of NK cell compartment.			
Endpoints	1. Flow cytometry data characterizing NK cell phenotype in blood and multiple lymphoid and mucosal sites. 2. Cytokine production and degranulation assays to probe NK cell function. 3. High-dimensional flow cytometry to characterize the functional maturation states of NK cells in tissues. 4. whole transcriptome profiling to reveal tissue-specific adaptations and residence properties of NK cells.			
Gender Included	French Mala			
Included	Female, Male			
Subjects Number	Female, Male			
Subjects				
Subjects Number Download	78 Study Download Packages			
Subjects Number Download Packages1	78 Study Download Packages			

## 2.2.1.2. Hardware and Software Architecture Components

 Table 2.4.1.2-1 below describes the hardware components and software components that constitute the architecture of ImmPort Shared Data.

Component Name	
JavaScript Object Notation (JSON)	A lightweight, human-readable data-interchange format widely used in web applications and web-based API's.
Spring Boot	Provides a ready to start Spring-based application deployment that utilizes best practices for the configuration (http://projects.spring.io/spring-boot/)
Spring Web MVC	Provides model-view-controller architecture (MVC) and components to develop flexible and loosely coupled web applications in the Spring family of components
AWS Aurora	A widely used open-source relational database system now owned by Oracle corporation. www.mysql.com
Angular 8+	A popular environment with interactive components for developing dynamic web-based applications using AJAX/JavaScript developed by Google but open source. https://angularjs.org
AWS ElasticSearch	Popular open source enterprise search platform built on Apache Lucene <sup>™</sup> utilizing Apache Tomcat as the servlet container (lucene.apache.org)
Google Analytics	Web monitoring tool framework provided by Google.
Amazon Web Services (AWS)	Amazon Web Services (AWS) provides cloud infrastructure and a wide array of server capabilities for developers to build production applications. (aws.amazon.com)
Elastic Compute Cloud (EC2)	Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud, designed to make development easier through ease of server creation, duplication, and shutdown along with providing a suite of configuration options for hardware and software/OS specifications.
Virtual Private Cloud (VPC)	Allows administrators to provision a logically isolated section of the AWS cloud where AWS resources can be created and launched in a customized virtual network
Simple Storage Service (S3)	Provides secure, durable, highly-scalable cloud storage.
Relational Database Service (RDS)	Provides pre-configured database servers for Oracle, SQL Server, PostgreSQL, MySQL, and MariaDB where AWS performs the database administration allowing the development team to focus energies on application-specific details and development.

## 2.2.1.3. Data Architecture

Data used by the ImmPort Shared Data application is stored and retrieved using multiple technologies. Primarily data is stored in an AWS Aurora MySQL database. The Shared Data schema maps closely to the Oracle production operational database but has been partly de-normalized to optimize query performance and to support the Data Query API. The database contains all information for all studies shared for public access.

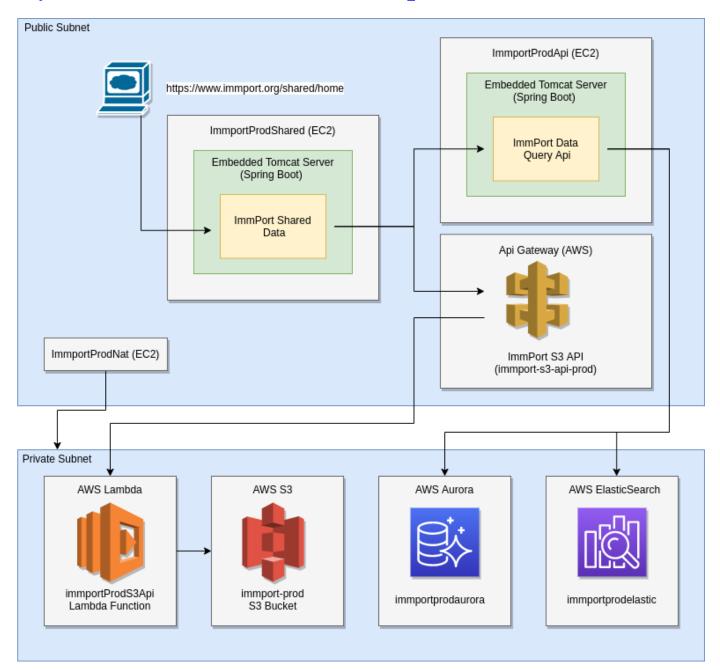
An AWS ElasticSearch index is used to support free text and faceted searching of study information and to support site search. The content index is updated with each quarterly release. ImmPort also uses AWS S3 buckets to host content generated as part of the Data Release process and remains static for each release.

An overview of the ImmPort Shared Data model is available on the website on the <u>Data Model</u> page. The table and column documentation is available on the website on the <u>Relational Database</u> page.

## 2.2.1.4. ImmPort Shared Data Server Architecture

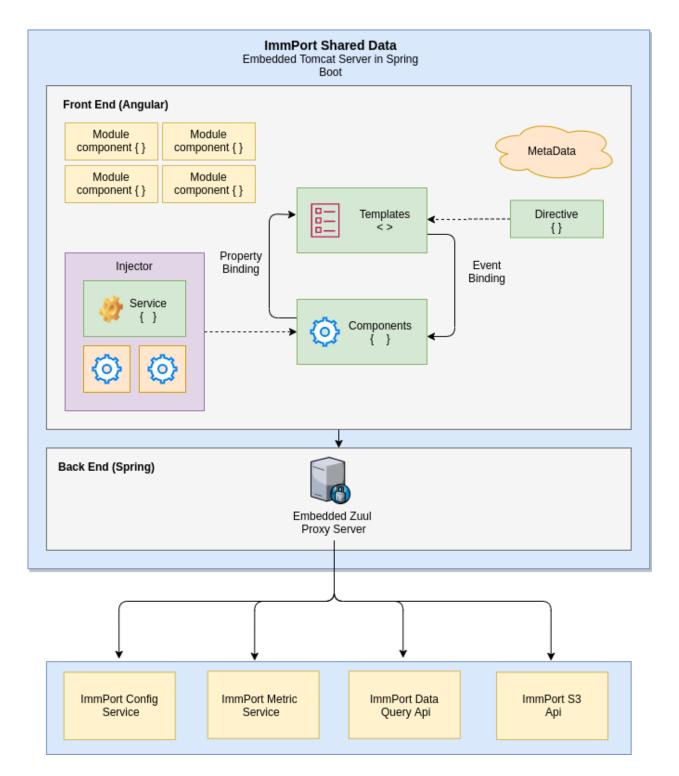
ImmPort Shared Data, on AWS, is separated into its own private network or VPC. The outward-facing Tomcat web server is contained in a public subnet where the site <u>www.immport.org</u> is directed while data servers are contained in a private subnet only available through the NAT EC2 server within the public subnet. This separation limits exposure to security threats in the data tier of ImmPort Shared Data. The configuration follows the AWS recommendations described at

http://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC Scenario2.html



# 2.2.1.5. ImmPort Shared Data Software Architecture

ImmPort Shared Data is a standard Java Spring-based web application. The client layer utilizes JavaScript AJAX frameworks such as JQuery and Angular to provide interactive graphical user interfaces. The Model, View, and Controller uses Spring Web MVC with Tiles/JSP to layout the web pages. Hibernate provides the data and persistence layer to the MySQL relational database via JDBC. Queries against SOLR are run through the web service connecting to the SOLR Tomcat server.



# 2.2.2. Study Search

#### 2.2.2.1. Fields

When a word is entered in the study search box. The following fields are searched: study accession^200, study accession.ngram^100, brief title^150, brief title.ngram^100, brief description<sup>100</sup>, brief description.ngram^30, description^10, description.ngram^5, doi^100, doi.ngram^30, endpoints^50, endpoints.ngram^20, hypothesis<sup>50</sup>, hypothesis.ngram<sup>20</sup>, objectives^50, objectives.ngram^20, official title^75, official title.ngram^20, sponsoring organization<sup>50</sup>, sponsoring organization.ngram<sup>20</sup>, research focus^5, arm or cohort all^5, arm or cohort all.ngram<sup>2</sup>, biosample.type^5, contract grant.name^5, contract grant.name.ngram<sup>2</sup>, contract grant.external id^5, program.program name^5, program.program name.ngram<sup>2</sup>, condition preferred^50, condition preferred.ngram^20, condition reported^50, condition reported.ngram^20, experiment all.ngram<sup>2</sup>, pubmed\_all.ngram^2, personnel all.ngram<sup>2</sup>, elisa result all.ngram<sup>2</sup>, elispot result all.ngram<sup>2</sup>, fcs analyzed result all.ngram<sup>2</sup>, hai result all.ngram<sup>2</sup>, hla typing result all.ngram<sup>2</sup>,

kir typing result all.ngram<sup>2</sup>,

mbaa\_result\_all.ngram^2, neut\_ab\_titer\_result\_all.ngram^2, pcr\_result\_all.ngram^2, reagent\_all.ngram^2, adverse event all.ngram^2

# 2.2.2.1. Aggregated Fields

The fields ending with "\_all" is a collection of the data of all the fields in that category. For example pcr\_result\_all is the data from the following fields:

pcr\_result.gene\_id
pcr\_result.gene\_name
pcr\_result.gene\_symbol\_preferred
Pcr\_result.gene\_symbol\_reported

#### 2.2.2.2. Boosting

Individual fields can be boosted with the caret (^) notation. Matches on the study\_accession (boost : 200), brief\_title (boost : 150), brief\_description (boost : 100),official\_title (boost : 75) have more relevance than the other fields since their boost factor is more. Example: If you search for the word "Monoclonal",

		к (123	▶ N 10 ∨		S	howing 1 to 10 of 2
0	Study \$	Title 🗢	Pubmed Id 🗢	Research Focus 🖨	Latest Release Version	Latest Release Date 🗢
~	🗹 SDY1 🛓	Efficacy and Safety Evaluation of Allergen Immunotherapy Co-Administered with Omalizumab (an anti-IgE Monoclonal Antibody) (ITN019AD)	16387596 17631952	Atopy/Allergy	DR21	2017-04-21
	Brief_title:	fety Evaluation of Allergen Immunotherapy Co-Admin fety Evaluation of Allergen Immunotherapy Co-Admin		, c		
~	🗹 SDY524 🛓	AbATE ITN027AI: Autoimmunity-blocking Antibody for Tolerance in Recently Diagnosed Type 1 Diabetes	23835333 28664195	Autoimmune	DR19	2016-06-17
	Brief_descript Anti-CD3 mono	ion: bolonal antibody (a.k.a. hOKT3gamma1 [Ala-Ala],tepl	izumab, MGA031) is a h	umanized antibody		
>	🗹 SDY961 🛓	Use of Rituximab for Sjogren's Syndrome (ASJ01)	23334994	Autoimmune	DR22	2017-06-16
>	🗹 SDY416 🛓	Study to measure the immune response to the influenza vaccine in patients with chronic plaque psoriasis		Vaccine Response	DR18	2016-03-18
~	🕑 SDY1544 🛓	LEA29Y (Belatacept) Emory Edmonton Protocol (LEEP) (CIT-04) and Extended Follow Up after Islet Transplantation in Type 1 Diabetes (CIT-08)		Transplantation	DR33	2020-01-29
	Objectives: this protocol is	to assess the safety and efficacy of an immunosuppre	essive medication consist	ting of a monoclonal		
~	🕑 SDY56 🛓	Systems Biology of 2010 trivalent Influenza vaccine (TIV) in young and elderly (see companion study SDY61 2007, SDY270 2009, SDY119 2011)		Vaccine Response	DR30	2019-04-12

SDY1 gets the highest score because the word "Monoclonal" was found in brief\_title (150) and official\_title (75) both have a high boost value.

SDY524 - has the second-highest score since the word "Monoclonal" was found in brief\_description (100) SDY1544 and SDY56 come later since Objectives (50) and EndPoints (50) have lower boost values

### 2.2.2.3. Ngram search:

Ngrams helps to search whether a term belongs to a word fully or partially. For example, if you search for "microbial"

		H 4 1	2 🕨 🕅 10 🗸		Sh	nowing 11 to 15 of 2
0	Study 🖨	Title 🗢	Pubmed Id 🗢	Research Focus 🖨	Latest Release Version	Latest Release Date <b>≑</b>
~	🖸 SDY148 🛓	The Role of Peroxisome Proliferator-Activated Receptor gamma in Immune Responses to Enteroaggregative Escherichia coli Infection	23469071	Infection Response	DR5	2013-11-01
	Description:	ion: al blockade and deletion of PPARg in T cells resu al blockade and deletion of PPARg in T cells resu				
~	🗹 SDY1162 🛓	Meta-Analysis of Vaginal Microbiome Data Provides New Insights On Preterm Birth	23715799 24987521 26283357	Preterm Birth	DR30	2019-04-12
	Description: While several o	f the microbial genera have been reported previ	ously, three of those nine n	icrobial genera		
~	🖸 SDY857 🛓	Prevention of Cardiac Allograft Vasculopathy Using Rituximab (Rituxan) Therapy in Cardiac Transplantation (CTOT-11)	31272550	Transplantation	DR29	2019-01-16
	Endpoints: Post-transplant	safety outcomes including; a) Serious infections	requiring intravenous antim	icrobial		
~	🗹 SDY572 🛓	Host responses to Enteroaggregative Escherichia coli (EAEC) infection	25483331	Infection Response	DR21	2017-04-21
		phan-free diet had reduced antimicrobial peptide reported that protein-energy malnutrition abrogate		• ·		
~	🗹 SDY720 🛓	Age-related alterations in innate immune responses (See companion study SDY736)	25728020	Immune Response	DR19	2016-06-17

SDY148 - anti-microbial (partial) SDY1162 - microbial (full) SDY857 - antimicrobial (partial)

#### 2.2.2.4. Phrase search

If a phrase is searched without the double quotes then the results will use the best\_fields type search. The best\_fields type is most useful when you are searching for multiple words best found in the same field. For instance "brown fox" in a single field as a phrase is more meaningful than "brown" in one field and "fox" in the other and "brown" and "fox" separated by other words in a single field. For example, if the phrase is 'clinical islet transplantation', 170 studies were found since first the studies with the phrase is found and then individual words are searched

0	Study 🗢	Title 🗢	Pubmed Id 🗢	Research Focus 🖨	Latest Release Version	Latest Release Date ≑			
-	🗹 SDY1432 🛓	132 🛓 Clinical Islet Transplantation Consortium (CITC)	23630300 24085506 24691031 25524910	Transplantation	DR30	2019-04-12			
			25629445 27208344						
			27325286 27465220						
			27571180 28319051						
			29563196 30211831						
	Condition_repo	rted:							
	Pancreatic Islet	Transplantation							
	Brief_description	on:							
	All studies treate	d participants with up to 3 separate infusions of isle	ets.						
	Description:								
		d participants with up to 3 separate infusions of isle	ets.						
	Objectives:								
	The studies investigated methods to improve the safety and efficacy of islet transplantation in treating								
	Condition_preferred:								
	Pancreatic Islet Transplantation								
	Hypothesis:								
	Islet transplantation is safe and effective for the treatment of patients with type 1 diabetes.								
	Official_title:								
	Clinical Islet Transplantation Consortium (CITC)								
	Brief_title:								
	Clinical Islet Transplantation Consortium (CITC)								
	Pubmed:								
	Improvement in b-cell secretory capacity after human islet transplantation according to the CIT07 protocol								
	Improvement in insulin sensitivity after human islet transplantation for type 1 diabetes.								
	Restoration of Glucose Counterregulation by Islet Transplantation in Long-standing Type 1 Diabetes.								
	Positron Emission Tomography to Assess the Outcome of Intraportal Islet Transplantation.								
	National Institutes of Health-Sponsored Clinical Islet Transplantation Consortium Phase 3 Trial: Manufacture								
	CLINICAL ISLET TRANSPLANTATION: DATA COORDINATING CENTER								
	INNATE IMMUNITY IN CLINICAL ISLET TRANSPLANTATION CLINICAL REFINEMENT OF ISLET TRANSPLANTATION								
		T TRANSPLANTATION AT NORTHWESTERN							
		T TRANSPLANTATION AT NORTHWESTERN T TRANSPLANTATION: CLINICAL CENTERS							
	Program_name:								

SDY1432 came up first since clinical islet transplantation was found in brief title(boost value 150)

~	🗹 SDY1544 🛓	LEA29Y (Belatacept) Emory Edmonton Protocol (LEEP) (CIT-04) and Extended Follow Up after Islet Transplantation in Type 1 Diabetes (CIT-08)		Transplantation	DR33	2020-01-29
	Endpoints: study is the prop HbA1c <7.0% A HbA1c <7.0% A CIT-08: The prin c-peptide level g Brief_descripti CIT-04: This tria	orted: Transplantation ND free of severe hypoglycemic events from Day 28 ND free of severe hypoglycemic events from Day 28 ND free of severe hypoglycemic events from Day 28 hary endpoint is duration of sustained islet allograft fu greater than or equal to 0.3 ng/mL at 0, 60, or 90 minu	to Day 365, inclusive, aff to Day 365, inclusive, aff unction as determined by ites will be considered e of <b>islet transplantation</b>	ter the first <b>islet</b> ter the final <b>islet</b> <i>y</i> evidence vidence of <b>islet</b> assessing		
	Description: All studies treate Objectives: a monoclonal ar transplantation		s. and mycophenolate mo			
	proportion of pa primary objectiv Condition_pref	bijective is to assess <b>islet</b> graft function in the absen- tients attaining and maintaining insulin independence e is to provide extended follow-up for safety and effice <b>erred</b> : <b>Transplantation</b>	after receiving a maxim	um of 3 islet		
	CIT-04 and CIT- complete avoida Official_title:	08: Transplantation of pancreatic islets is a safe an unce of the anti-angiogenic drug, sirolimus will create cept) Emory Edmonton Protocol (LEEP) (CIT-04) and	a more favorable enviror	nment for islet		
	LEA29Y (Belata Contract_grant ADVANCING IS ISLET TRANSP CLINICAL REF	LET TRANSPLANTS FOR TYPE 1 DIABETES CARE LANT - COSTIMULATORY BLOCKADE WITH LEA2 NEMENT OF ISLET TRANSPLANTATION	E	ter Islet Transplantation		
	Program.progr	T TRANSPLANTATION AT NORTHWESTERN am_name: ansplantation Consortium RFA-DK-09-501				

SDY1544 came up ninth since clinical islet transplantation was found in contract grant name(boost value 5)

🗹 SDY960 🛓	Viral Triggers in Pediatric Lung Transplantation (CTOTC-03)	27941431 28639398 29082660 31216376 32686323	Transplantation	DR29	2019-01-16			
Arm_or_cohort:								
Pediatric lung transplantation								
Condition_reported:								
Lung <b>Transpla</b>	ntation							
Pediatric Lung	Transplantation							
Endpoints:								
the earliest time	e to bronchiolitis obliterans syndrome (BOS) or obli	terative bronchiolitis (OB), I	retransplantation					
-	endpoints are times to each of the following events	: BOS or OB, retransplant	tation or death					
Brief_descript								
	ase the risk of bronchiolitis obliterans syndrome, ob	literative bronchiolitis, deat	th or retransplantation					
Description:								
infections increase the risk of bronchiolitis obliterans syndrome, obliterative bronchiolitis, death or retransplantation								
Condition_preferred:								
Lung Transplantation								
Hypothesis:								
	he risk of bronchiolitis obliterans syndrome, oblitera	tive bronchiolitis, death or	retransplantation					
Official_title:								
	f Alloimmunity and Autoimmunity in Pediatric Lung	Transplantation (CTOTC-	03)					
Brief_title:								
Viral Triggers in Pediatric Lung Transplantation (CTOTC-03)								
Pubmed:								
	ting MicroRNAs in the Immunopathogenesis of Rej		Transplantation					
Anellovirus loads are associated with outcomes in pediatric lung transplantation.								
Absence of evidence that respiratory viral infections influence pediatric lung transplantation outcomes								
Epidemiology and Persistence of Rhinovirus in Pediatric Lung Transplantation.								
Contract_gram				20)				
	ERS OF ALLOIMMUNITY AND AUTOIMMUNITY IN	PEDIATRIC LUNG TRAN	SPLANTATION (CTOTC-	03)				
Program.prog								
Clinical Trials i	in Organ Transplantation in Children (CTOT-C) RF	A-AI-12-005						

SDY960 came up 10th since the phrase was tokenized by space. And the tokenized words were found in fields. For example, if the phrase is 'Ad35.CS.01' is tokenized and then searched.

If a phrase is searched with the double quotes then the results will use the phrase\_prefix type search. The whole phrase will be found in the fields For example if the phrase is "clinical islet transplantation", 8 studies were found. If "Ad35.CS.01' is searched with double quotes only one study shows else 18

# 2.2.3. ImmPort Data Query API

The Data Query API provides programmatic access to ImmPort Shared Data. This API works as a query tool to access ImmPort descriptive data (metadata) and interpret results for assays such as ELISA, ELISPOT, MBAA (Luminex), HAI, Neutralizing Antibody Titers, HLA and KIR typing, QPCR, flow and mass cytometry-based on various input filter parameters. The API returns a JSON output by default. A tab-separated output can also be returned if format=tsv is passed as a parameter to the specified endpoint. The HTTP method supported by this API is GET for this version of this API.

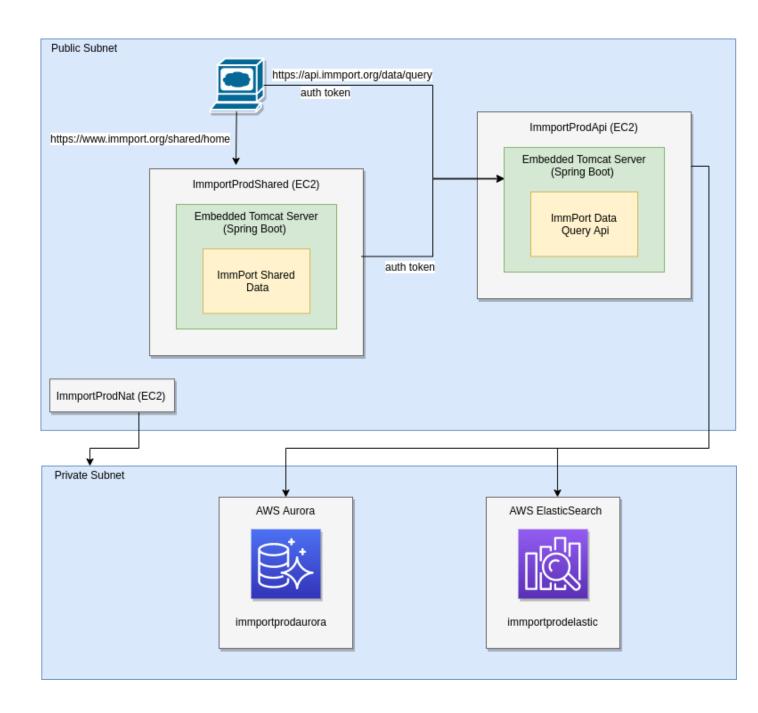
Data Query API endpoints can be accessed directly by a user or by an application. The ImmPort Shared Data application uses some of the endpoints to get data for the search and study detail pages. All requests to the Data Query API require authentication and the Data Query API uses tokens for authentication. Users can obtain tokens by posting to the ImmPort Authentication URL- <u>https://auth.immport.org/auth/token</u> with their username and password. They must include the authentication token as an Authorization: bearer in the custom HTTP header.

## 2.2.3.1. Feature Summary

This link documents the endpoints of the API https://docs.immport.org/#API/DataQueryAPI/dataqueryapi/

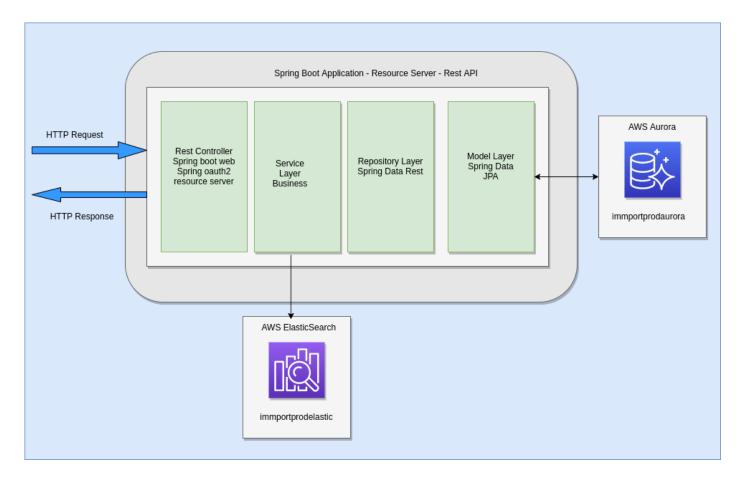
# 2.2.3.2. ImmPort Data Query API Server Architecture

The ImmPort Data Query API is hosted in AWS on an EC2 instance in the public subnet. The data servers are contained in a private subnet only available through the NAT EC2 server within the public subnet. This separation limits exposure to security threats in the data tier of ImmPort Data Query API. The configuration follows the AWS recommendations described at <a href="http://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC\_Scenario2.html">http://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC\_Scenario2.html</a>



# 2.2.3.3. ImmPort Data Query API Software Architecture

ImmPort Data Query API is a Spring Boot application using Spring JPA which makes it easier to build Spring-powered applications that use data access technologies. It also exposes a study search endpoint that calls a method on the service layer. The service layer builds the elastic search queries based on the parameters sent to the endpoint and then queries the AWS ElasticSearch service that has a study index that contains study JSON files. The Model, Repository, and Service Layers are different java applications. The API layer depends on these applications and packages them during the build process into a single jar file.



# 2.2.4. ImmPort Data Browser

The Data Browser is a web-based application with the use of similar web frameworks as ImmPort Shared Data described previously. The interactive UI is handled by Angular components using AJAX and JavaScript, while the MVC architecture is implemented in Spring. Aspera Security is utilized when calls are made to download content on the data files and directories identified in the Aspera Node Server. The Aspera Connect Server governs interactions with the data files and directories via the Aspera Connect Client.

# 2.2.4.1. Feature Summary

Table 2.4.4.1-1 below summarizes the major functionality of ImmPort Data Browser.

#	Capabilities/Features	Capability/Feature Description
1	Browse Study Files	Allows users to browse the shared data study files and packages that are available to download in the current data release
2	Download Study Files/Packages	Allows users to select and download study files packages from the latest data release.
3	Download archive	Allows users to download study files from the older versions that are moved into the archives directory.

#### Table 2.4.4.1-1: Summary of ImmPort Capabilities and Features

## 2.2.4.1.1. Feature 1: Home Page

The Data Browser home page provides a list of studies and files available to download in the latest data release. Users can browse through the list of studies and can select a study directory or pick files across studies to download.

	lata browser allows users to download ImmPort data by individual file, dir Port to users. Here are the $\mathbb{C}^{2}$ Instructions to install Aspera Connect on yo		ed Aspera Connect to transfer fi
	ontent Listings		
10	Untern Listings		
Province	e Shared Data		
TOWSE			
		wnload X Clear	
	Name 1	Size 1	Last Modified 1
	ALLSTUDIES (2359 files)	74.68 GB	Jun 14, 2021 11:00 AM
	Retired (523 files)	6.22 GB	Apr 12, 2019 7:59 AM
	SDY1 (11414 files)	10.56 GB	Jun 14, 2021 10:56 A
	SDY10 (153 files)	53.78 MB	Jun 14, 2021 10:56 A
	SDY100 (309 files)	520.88 MB	Jun 14, 2021 10:57 A
	SDY1015 (705 files)	10.21 GB	Jun 14, 2021 10:58 Al
	SDY1025 (185 files)	175.60 MB	Jun 14, 2021 10:58 Al
	SDY1026 (146 files)	41.46 MB	Jun 14, 2021 10:58 Al
	SDY1027 (128 files)	22.67 MB	Jun 14, 2021 10:58 Al
	SDY1028 (171 files)	89.73 MB	Jun 14, 2021 10:58 Al
	SDY1029 (123 files)	26.09 MB	Jun 14, 2021 10:58 Al
	SDY1039 (94 files)	71.59 MB	Jun 14, 2021 10:58 Al
	SDY1041 (826 files)	28.12 GB	Jun 14, 2021 10:58 Al
	SDY1043 (304 files)	7.21 GB	Jun 14, 2021 10:58 AM
	SDY1045 (84 files)	21.11 MB	Jun 14, 2021 10:58 A

#### 2.2.4.1.2. Feature 2: Study Drill down

Users can drill down into each study to select individual files and packages to download. An example snapshot of data available in each study is below.

Example: SDYxx-DRxx\_MySQL.zip is a MySQL dump of the study SDYxx in data release DRxx

Similarly, tab-separated files packaged as a zip file are available to download for each study.

Each study has an archive directory where previous versions of the study can be found. If a user is looking for a study in a particular data release it can be found in the archives directory.

# Browse Shared Data > SDY1 \* Archive files are disabled for download in this view, please navigate into the archive directory to download them.

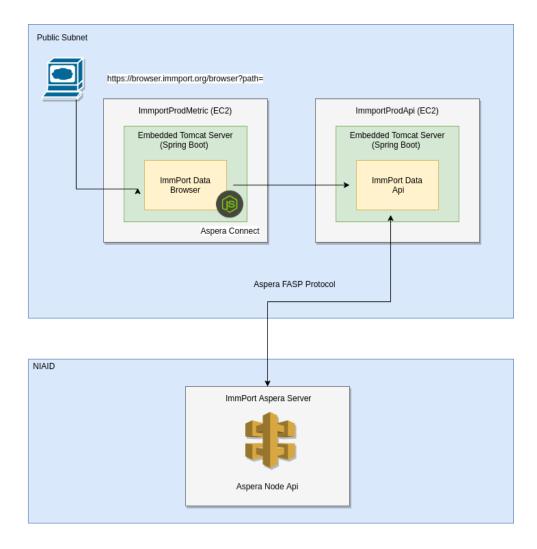
	<b>▲</b> Download ★ Clear		
×.	Name 1k	Size ↑↓	Last Modified $\uparrow\downarrow$
	Protocols (5 files)	1.27 MB	Feb 9, 2016 12:17 PM
	ResultFiles (11215 files)	3.86 GB	Jun 12, 2015 8:57 AM
	SDY1-DR40_MySQL.zip	11.48 MB	Jun 14, 2021 10:56 AM
	SDY1-DR40_Subject_2_Flow_cytometry_result.txt	9.70 MB	Jun 14, 2021 10:56 AM
	SDY1-DR40_Tab.zip	10.32 MB	Jun 14, 2021 10:56 AM
	SDY1-DR40_manifest.txt	701.76 KB	Jun 14, 2021 10:56 AM
	SDY1-DR40_summary.txt	60.00 bytes	Jun 14, 2021 10:56 AM
	SDY1-DR40_table_count.txt	2.31 KB	Jun 14, 2021 10:56 AM
	StudyFiles (6 files)	43.98 MB	May 27, 2021 15:56 PM
	* archive (182 files)	6.63 GB	Jun 14, 2021 10:56 AM

#### 2.2.4.1.3. Feature 3: Aspera Connect Download

The ImmPort data browser allows users to download ImmPort data by individual file, directory, or study. The data browser uses a software tool called Aspera Connect to transfer files from ImmPort to users. This software works with the user's internet browser to quickly and securely transfer files. Aspera Connect requires data downloaders to install the Aspera Connect Client Plugin onto their computer where the files will be downloaded. The Aspera Connect plugin can be downloaded directly through the ImmPort data browser. Here are the instructions for the Aspera Connect Installation <u>https://www.immport.org/installAsperaHelp</u>

Alternatively, the installation files and documentation for the plugin can also be found here <a href="http://downloads.asperasoft.com/connect2/">http://downloads.asperasoft.com/connect2/</a>

#### 2.2.4.2. ImmPort Data Browser Architecture



### 2.2.5. ImmPort Data API

The ImmPort Data API is used by the ImmPort Data Browser to browse and download ImmPort shared data on the Aspera Production Server at NIAID. It is also used by ImmPort users who wish to programmatically browse and download ImmPort shared data after obtaining an ImmPort token.

ImmPort Data API allows users to browse and download files and directories on an Aspera Server and to create content listing files for these files and directories (all via POST requests only). ImmPort Data API endpoints are protected and require an ImmPort token to access. ImmPort Data Api fetches an Aspera token internally to talk to the Aspera Server to download the files.

#### 2.2.5.1. Feature Summary

Following are the endpoints available in ImmPort Data API

```
https://api.immport.org/data/content/listing/information
gets the name of the content listing directory and the start
and end times of the content listing file generation.
```

https://api.immport.org/data/content/listing/creation creates files containing the content listings sorted alphabetically, by size, and by last modification date in both ascending and descending order for each directory.

https://api.immport.org/data/content/listing/report
Returns a a JSON report of the content listing creation

<u>https://api.immport.org/data/</u>list

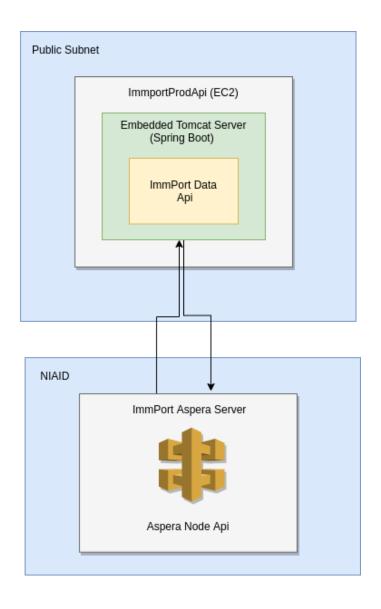
takes a list of files and directories and downloads them from the aspera server as a zip package.

https://api.immport.org/data/download/token
Returns an aspera download token

```
https://api.immport.org/data/download/specification
Returns an aspera download specification
```

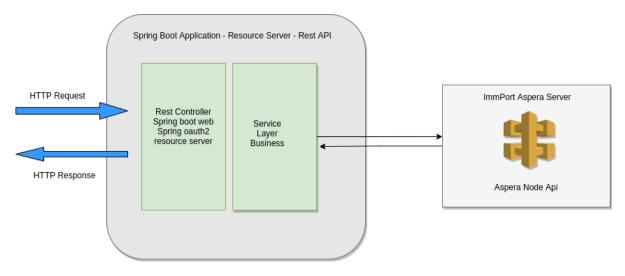
#### 2.2.5.2. ImmPort Data API Server Architecture

The ImmPort Data API is hosted on an EC2 instance in the public subnet on AWS. The Aspera server is hosted on the NIAID On-premises infrastructure.



### 2.2.5.3. ImmPort Data Query API Software Architecture

ImmPort Data API is a Spring Boot application with a service layer containing a Content Service for listing and downloading ImmPort shared data using the Aspera Node API.



### 2.2.6. ImmPort Resources

ImmPort Portal is a static web application that hosts all static web pages required across ImmPort web applications.

#### 2.2.6.1. Feature Summary

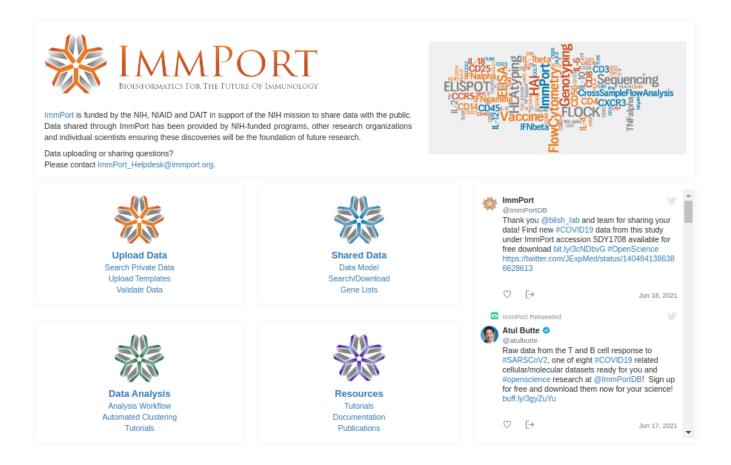
 Table 2.4.6.1-1 below summarizes the major functionality of ImmPort Data Browser.

#	Capabilities/Features	Capability/Feature Description
1	Static page	All static web pages required across all ImmPort applications
		Ex: Home page, user agreement page, Aspera installation instructions, etc.,
2	ImmPort Tutorials	Hosts several ImmPort tutorials and the instructions to use them
3	ImmPort Documentation	Data Upload and templates documentation

Table 2.4.6.1-1: Summary of ImmPort Capabilities and Features

#### 2.2.6.1.1. Feature 1: Home Page

The ImmPort home page is the landing page of the ImmPort Ecosystem and hosts several links to various ImmPort applications



#### 2.2.6.1.2. Feature 2: User agreement

ImmPort is a data sharing and data analysis portal for the immunology research community funded by the National Institute of Allergy and Infectious Diseases (NIAID), Division of Allergy, Immunology, and Transplantation (DAIT). Users will be asked to accept the terms and conditions of this agreement without exception when they log in to ImmPort.

#### User Agreement for the NIAID Immunology Database and Analysis Portal (ImmPort)<sup>i</sup>

#### ImmPort is a data sharing and data analysis portal for immunology research community funded by the National Institute of Allergy and Infectious Diseases (NIAID), Division of Allergy, Immunology, and Transplantation (DAIT). You will be asked to accept the terms and conditions of this agreement without exception when you log in to ImmPort.

#### 1.1 You will not attempt to identify individuals from ImmPort data sets

As a condition of obtaining access to the ImmPort database you agree to not use the ImmPort data, alone or in combination with other data, to identify any individual or entity or otherwise link information from these data with information in another dataset in a manner that includes the identity of an individual or entity. If you inadvertently discover the identity of any patient, then (a) You agree that you will make no use of this knowledge, (b) that you will notify the NIAID Program Officer (Quan Chen, quan.chen@nih.gov) of the incident, and (c) that you will inform no one else of the discovered identity.

#### 1.2 Do not share your username and password

You will use reasonable efforts to maintain the secrecy of the user name issued to you by ImmPort and the password corresponding to the user name. Without limiting the foregoing, you will not share password or user name information with others or allow others to use your password and/or user name.

#### **1.3 Data Provider Obligations**

If errors with provided data are identified at a later date, the Data Provider agrees to update uploaded data for accuracy.

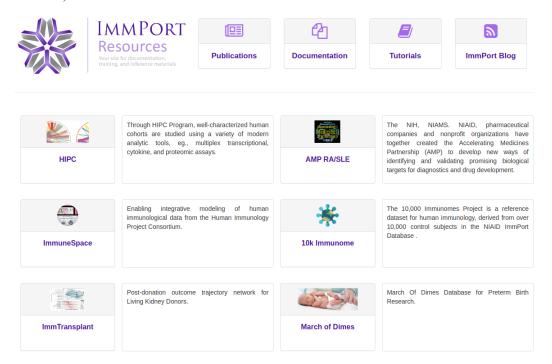
#### Warranties and Liability

#### 2.1 Data available at ImmPort are provided on an "AS IS" basis.

NIAID, Northrop Grumman, and Data Provider make no representations with respect to Data. DATA ARE PROVIDED TO YOU WITH NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING: WARRANTIES OF MERCHANTABILITY; WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE; WARRANTIES OF IDENTITY, OWNERSHIP, QUALITY, ACCURACY, OR COMPLETENESS OF DATA; OR WARRANTIES THAT THE USE OF DATA WILL NOT INFRINGE ANY PATENT, INTELLECTUAL PROPERTY, OR PROPRIETARY RIGHTS OF ANY PARTY.

#### 2.2.6.1.3. Feature 2: Resources Page

ImmPort Portal also hosts links to several ImmPort resources like ImmuneXpresso, Cell Ontology, ImmuneSpace, 10K Immunome etc.,



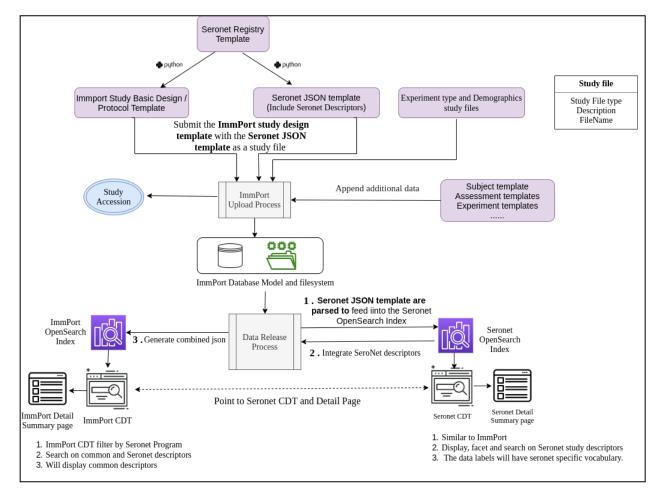
#### 2.2.6.2. SeroNet CDT

#### 2.2.6.2.1. Introduction

Purpose: A Resource Study catalog of SeroNet studies with faceted search capability

Worked with the SeroNet team on defining the JSON structure needed for building the OpenSearch index

- Developed software program to extract data from the SeroNet registry template into the JSON structure
- Developed SeroNet specific Search Interface that mimics the ImmPort CDT UI and facet on their specific study descriptors
- Developed SeroNet specific Study Detail pages to display their study descriptors and vocabulary
- Extended the ImmPort search to include SeroNet specific descriptors in the free text search
- Extended the data release process to build OpenSearch indexes for SeroNet search
- Added navigation links between ImmPort CDT and SeroNet CDT



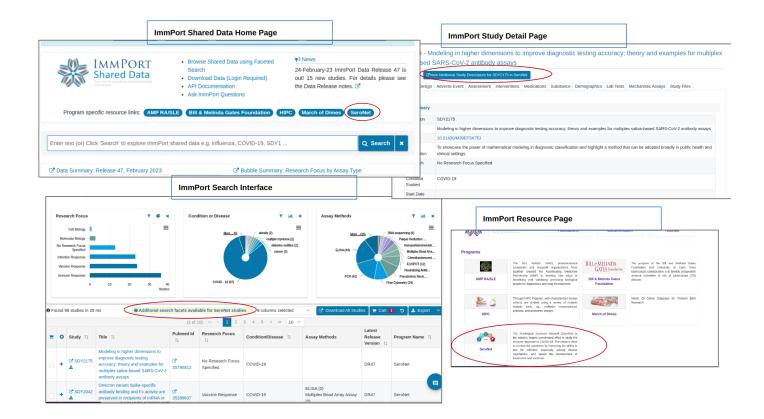
#### 2.2.6.2.2. Architecture

2.2.6.2.3. Feature Summary

Resources												Documentation Pu	blications Tutoria	als
Search Se	eroNet St	udies	r N	eroNet is led by NCI, in cl ation's top biomedical res ICI "to develop, validate, in an be applied immediately	earch institutions. 1 mprove, and impler	The network w ment serologie	vas established using t cal testing and associa	unds from an emerge ted technologies." Le	ncy appropriation of s	5306 milli	ion to	👹 Search /	All Covid Studie	es
T FILTERS				nza, COVID-19, Rheumal	toid, Lupus, MBAA	(minimum	3 characters)			d	Clear All			
^ Study	+ •	Studies(20)												
✓ Research Focus	œ													
<ul> <li>Study Type</li> </ul>	œ												Show Hi	ide
<ul> <li>Clinical Study Design</li> </ul>	✓ Clinical Study Design (± <sup>+</sup> )													
Enrollment Date (yyyy-mm-dd)			Study Type		٣	© ×			т 🚯 🗙	•				
✓ Reported Health Condition	œ	No Research Focus Specified			Preclinical Study		_		SARS - CoV-2 WA1/20	SARS - CoV-2 WA1/20	=	2		
<ul> <li>SARS-CoV-2 Vaccine Type</li> </ul>	1.		Molecula	r Biology	Method Development		Si		SARS - CoV-2 Alpha; B Multiple Myeloma Atopic Dermatitis	tiple Myeloma.				
🗸 in silico Model Type	U.S			Response	_			Basic Research Atopic Dermatina Asthma Serosurvellance Asthina						
			Vaccine F				Epidemiological	Research			SARS - CoV-2 Wuhan/2 SARS - CoV-2			
^ Subject	+ -		nfection F	0 2 4	6 8	10 12	Clinical	Research 0 2	4 6	8 10	Covid - 19	0 5 10	15 20 25	5
✓ Genus and Species	Ш‡					Studies				Studies			Studies	5
✓ Sex at Birth	1.	<b>0</b> Court	nd 20 4	tudiaa in 6 ma							6 columns selected	✓ T Cart	D 🕹 Export	
V Race	1.	Found 20 studies in 6 ms					(1 of	2) « < 1 2	> >> 10 \		o columns selected	• Fr Call		
<ul> <li>Ethnicity</li> </ul>	u.*	-	0	Study	Title		(2.0)	Pubmed Id 1	Research Focus	Repor	rted Health Condition ↑↓	SARS-CoV-2 Vacc	ine Type	
<ul> <li>Pregnant subjects</li> </ul>	1.			-	Household Tran	smission of S	Severe Acute		†↓	Covid	40			*
✓ Age (Years)	1.*		+	🕑 SDY2141 📥		Respiratory Syndrome Coronavirus 2 in the United States: Living Density, Viral Load, and		2 34383889	89 Infection Response		-CoV-2 WA1/2020 (D614G	Not Applicable		
<ul> <li>Pediatric subjects</li> </ul>	Шţ						communities of Color and restrictions on		variant)		int)			
<ul> <li>Geriatric subjects</li> </ul>	I.		+	🕑 SDY2135 📥	social gathering		and reservations on	Z 36058184	Response	Covid	-19	Not Applicable		

Developing the SeroNet Search Interface was a flexible Approach

- New field can be easily added
- SeroNet JSON file contains all SeroNet Descriptors in a particular format
- Develop SeroNet Search Interface/ SeroNet Detail Page
  - Facet/Search on SeroNet descriptors
  - Fields will have SeroNet vocabulary
- Extend ImmPort Search Interface
  - Augment the ImmPort descriptors with SeroNet descriptors (do not fit in our data model) to better search SeroNet studies (Under Exploration)
  - Point to SeroNet Search Interface when the user is querying for SeroNet studies



### 2.2.7. ImmPort S3 API

ImmPort S3 API is an Amazon API Gateway fully managed by AWS. It is a RESTful API created to read and write to the JSON files stored on the AWS S3 buckets. The purpose of this API is to push updates to ImmPort web pages outside their build cycles. For example, ImmPort announcements on the Shared Data home page are stored in a JSON file on the S3 bucket, a new announcement will require only a JSON file update on the S3 bucket instead of a complete build cycle of the software. AWS Lambda is employed for some of the endpoints to do any data processing that is needed prior to returning the data to the user.

#### 2.2.7.1. Feature Summary

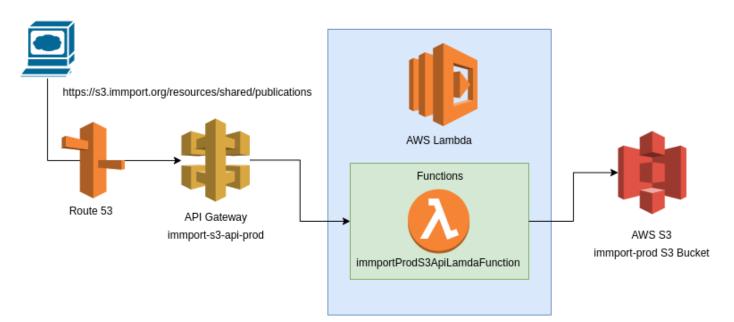
Following are the endpoints available in ImmPort S3 API accessible at the URL https://s3.immport.org/



OPTIONS

#### 2.2.7.2. ImmPort S3 API Server Architecture

The ImmPort Data API is hosted on an EC2 instance in the public subnet on AWS. The Aspera server is hosted on the NIAID On-premises infrastructure.



### 2.2.8. ImmPort CloudFront Distributions

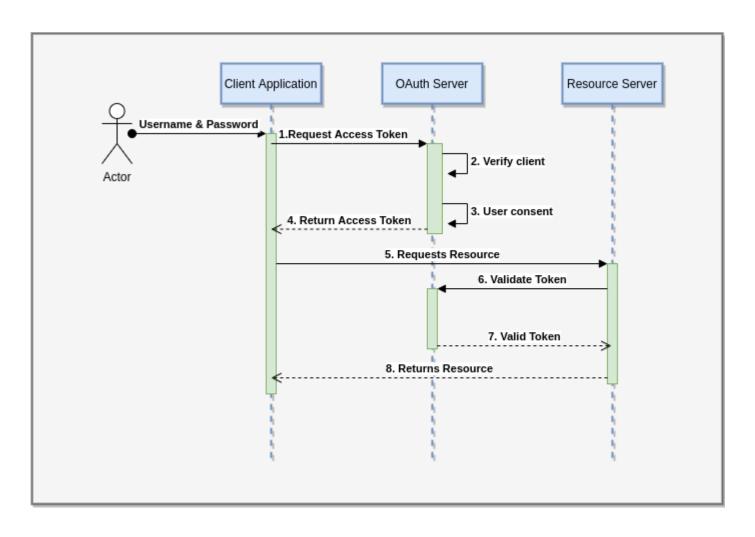
ImmPort configures Amazon CloudFront distributions to server HTTPS requests for the following two ImmPort S3 buckets.

- 1. downloads.dev.immport.org: Used for allowing users to download data upload templates and example packages.
- 2. docs.immport.org: Used for Static website hosting of API documentation website.

Content is for public use on these S3 buckets.

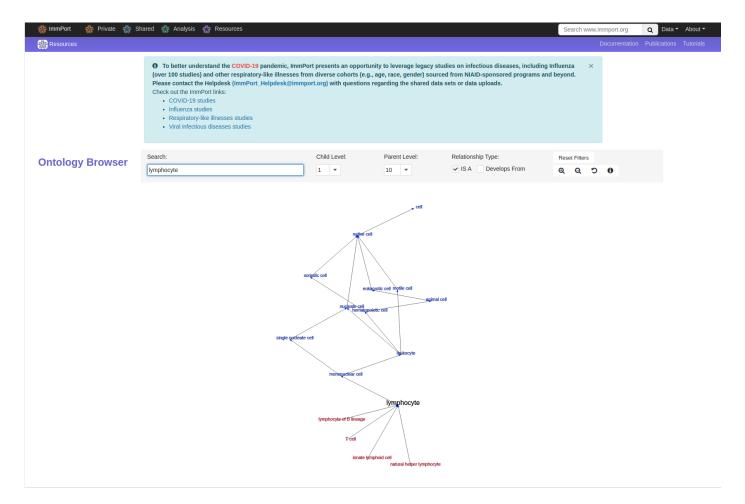
### 2.2.9. Authentication of the Rest API - Resource Servers

The Rest APIs are OAuth 2.0 Resource Servers built using Spring Security 5. In the context of OAuth 2.0, a resource server is an application that protects resources via OAuth tokens. These tokens are issued by an authorization server, typically to a client application. The job of the resource server is to validate the token before serving a resource to the client. JWT, or <u>JSON Web Token</u> is a way to transfer sensitive information securely in the widely-accepted JSON format. The contained information could be about the user, or about the token itself, such as its expiry and issuer. To visualize, let's look at a sequence diagram for the authorization code flow and see all the actors in action:

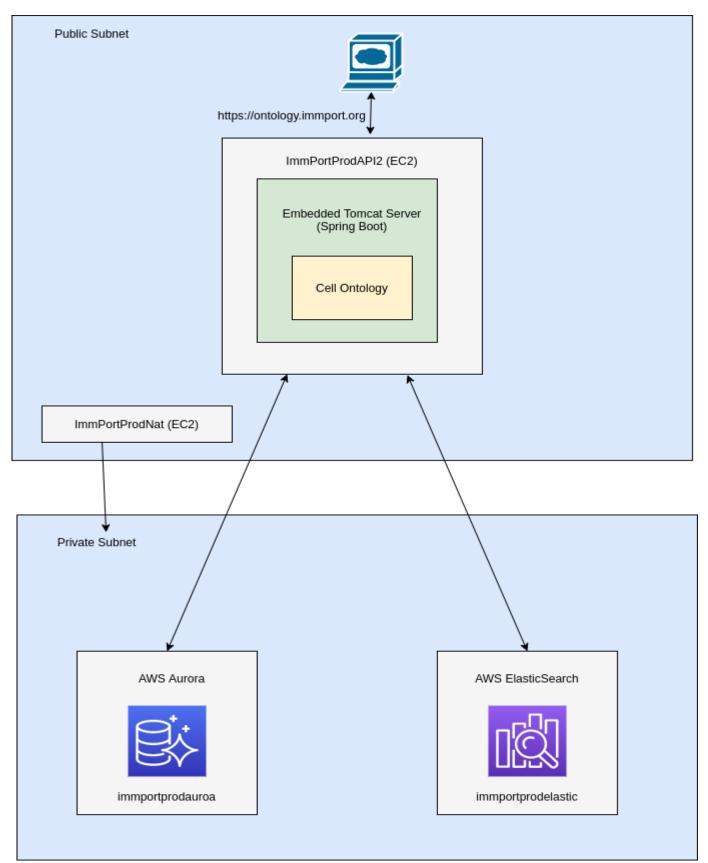


### 2.2.10. Cell Ontology Browser

The Cell ontology browser was developed to support the visualization of the Cell Ontology (http://obofoundry.org/ontology/cl.html), which is of great utility in the curation of ImmPort data for the standardization of cell populations. The browser provides a force-directed graph visualization of the ontology, and utilizes the same software stack (Angular, ElasticSearch, MySQL) as other ImmPort applications, to allow for searching for Cell Ontology terms with the addition of D3 for the visualization component. The content is updated as part of the ImmPort data release process.

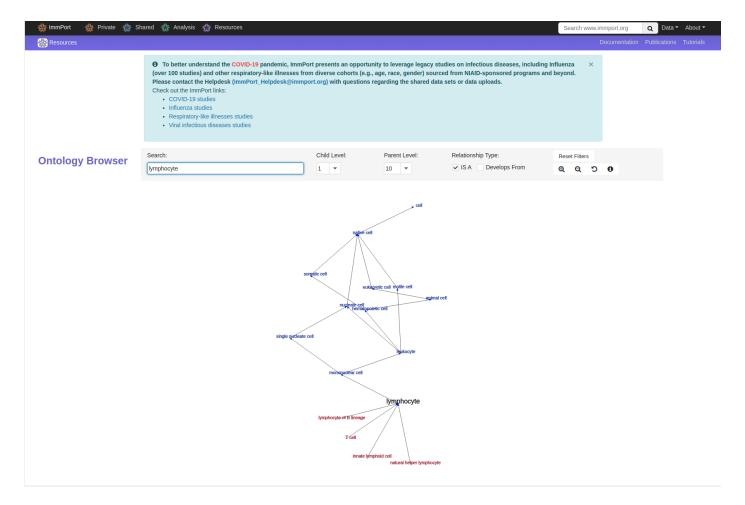


## 2.2.10.1. Cell Ontology Browser Architecture

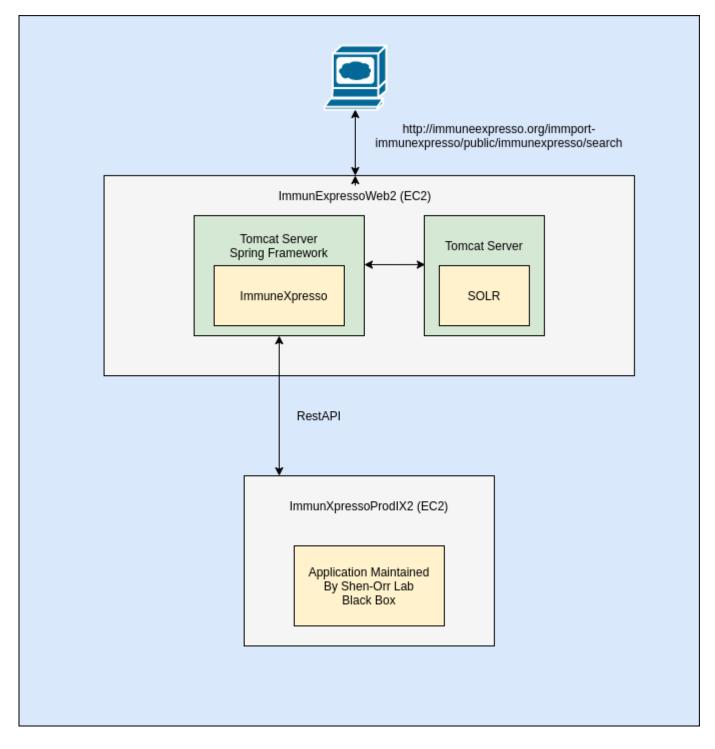


### 2.2.11. ImmuneXpresso

The ImmuneXpresso application was built under the BISC Contract Option 7 in years 2014-2015 and developed in collaboration with the team at the Shen-Orr lab at Technion (<u>http://shenorrlab.technion.ac.il/</u>). ImmuneXpresso continues the work of the Shen-Orr lab in mining PubMed abstracts to determine relationships between cells and cytokines. The primary content is stored on a standalone EC2 hosting a MySQL database and accessible via a RESTFul API. This EC2 instance is maintained by the Shen-Orr lab, and a black box to the ImmPort team. The front-end technology follows the same design pattern as most single-page applications but was written before frameworks like React and Angular were available. The code base is 5 years old and not updated to use the Angular framework like other ImmPort applications. ImmuneXpresso term queries are supported by SOLR indexing of cell and cytokine terms.



#### 2.2.11.1. ImmuneXpresso Architecture



### 2.2.12. Galaxy

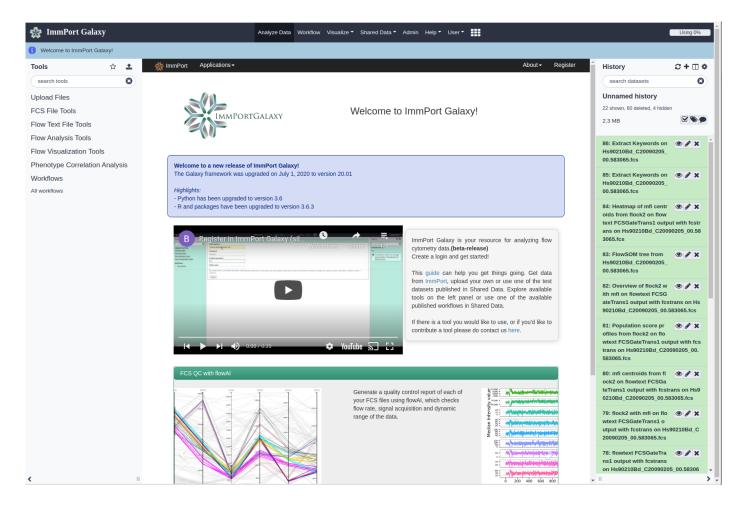
The original ImmPort Open application provided support for flow cytometry analysis primarily using the FLOCK (FLOw Clustering without K) algorithm. During the current contract, we have chosen to utilize the popular analysis workflow engine Galaxy (https://galaxyproject.org/) to optimize the modular method and component development and eventual sharing of data and workflows. The use of a publicly available web analysis framework was chosen over

the direct replacement of existing code in ImmPort because of the existence of open-source tools that largely perform the workflow capabilities of queuing, bursting, and chaining methods in a generic way and to reduce the cost to the ImmPort development team when developing and maintaining code to perform those workflow capabilities.

Galaxy is an open, web-based platform for accessible, reproducible, and transparent computational research. The ImmPort Galaxy platform is focused on providing tools for flow cytometry analysis. In addition to implementing many R/BioConductor packages for flow cytometry analysis, the ImmPort team has written several modules to aid in the visualization of the results. Below is a list of some of the tools available in the ImmPort Galaxy application:

- Clustergrammer
- Flock version 2 and 3
- flowAI
- flowCL
- flowDensity
- flowStats
- flowViz
- FlowSOM
- MetaCyto

The ImmPort Galaxy instance is hosted on an AWS EC instance and uses additional volumes to host the Galaxy file system and an Aurora PostgreSQL instance to support the Galaxy database.



### 2.2.13. ImmuneSpace

ImmuneSpace, available at www.immunespace.org, was developed by the team at the Gottardo lab (http://www.rglab.org) at Fred Hutchinson Cancer Center with the team at Labkey Software (www.labkey.com) underfunding of the Human Immunology Project Consortium (www.immuneprofiling.org). Details about the project are available at the ImmuneSpace site and the architecture in the Labkey product pages. The ImmPort team provides hosting and basic IT services on AWS for ImmuneSpace in the AWS instances funded by NIAID/DAIT.

				nnundig hejet Gesolun				
			Enabling integrati human immunolo					
	21017,4 0.5 10 22003,1 0 155425,# 0.5	Low respone	The Human Immunology Project Consortium (HIPC) program, established in 2010 by the NIAID Division of Allergy, Immunology, and Transplantation, is a major collaborative effort that is generating large amounts of cross-center and cross-assay data — including high-dimensional data					
	Lyophies study: Activated CDI-1 - Cell			<ul> <li>to characterize the status of the immune system in diverse populations under both normal conditions and in response to stimuli. This large data problem has given birth to ImmuneSpace, a powerful data management and analysis engine where datasets can be easily explored and analyzed using state-of-the-art computational tools.</li> </ul>				
	Public Data Summary		You can self register via the "Regist For more information and updates, f					
	studies		No recent announcements	User Name				
	Participants	7138		john4.campbell@ngc.com				
	CYTOF	657		Jointe.compen@rige.com				
	ELISA	3238		Password				
	LISPOT	1984		?				
F	low Cytometry	1690		Remember				
	Sene Expression	2791						
	IAI	2204		Sign In Register				
	ILA Typing	2622						
	IBAA	889						
	Neutralizing Antibody	2085						
F	PCR	335						
	Imm		w @inmunespace {766 followers > Tweet ted by <u>HIPC</u> and <u>NIAID</u> , tested with <u>SauceLabs</u> • <u>Contac</u>	<u></u>				

### 2.2.14. Metrics

Elasticsearch and Kibana (EK) Stack on AWS is used for storing, searching, and visualizing log and metric data. This allows for better searches and creates more analytical graphs for usage metrics. An Elasticsearch, Fluentd, and Kibana (EFK) Stack was initially considered but we decided on the Elasticsearch, Metric Rest API, Kafka, Aurora Mysql stack.

#### 2.2.14.1. A common data model for Metrics

• A common JSON format was devised after looking at the various data elements of each of the different applications so that it can be easily searched and visualized. The common format that was formulated was as follows:

```
{
// common parameters
"metricId": "",
```

```
"metricType": "",

"username": "",

"remoteIpAddress": "",

"organization": "",

"applicationName": "",

"endPoint": "",

"startTime": "",

"ngUser": "",

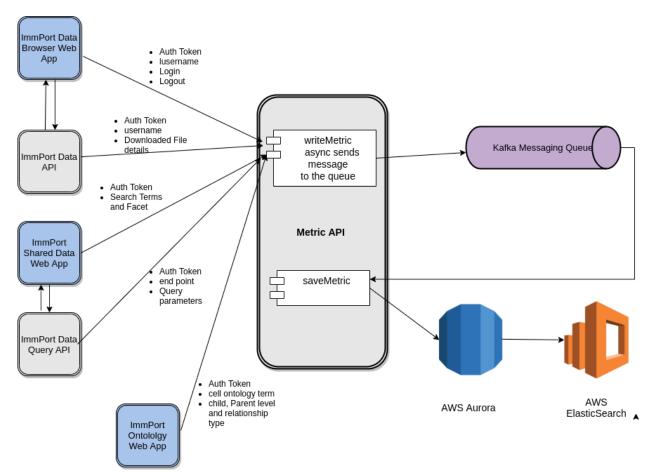
"dateCreated": "",

"createdBy": "",
```

###The parameters field is an object of data elements for the different applications. The different applications will fill in the appropriate fields.

```
"parameters": {
    "searchTerm": "", parameter for ImmPort shared data
    "clinical": "Y",
    .....
    "fileName": "" parameters for ImmPort Data Browser
    "fileSize": "",
    .....
    "parentLevel" :"", parameters for ImmPort Ontology
    "relationshipType" :"",
    .....
    "ageEvent":"", parameters for ImmPort Data Query API
    "expsampleAccession":"",
    ....
}
```

- Historic metric data currently stored in CORE\_IMMPORT was copied to the Metric Database on AWS Aurora
- The current and historic data in the Metric Database on AWS Aurora was cleaned, validated and transformed to the new format and stored in a new table in AWS Aurora MySQL database called metric\_log which conforms to the new format.
- Data from this table was extracted as JSON files and then sent to ElasticSearch.



#### 2.2.14.2. Metrics Software Architecture

- REST has quickly become the de-facto standard for building web services because they're easy to build and consume. We built a Rest API to collect metrics from all ImmPort Applications so we have a central application to collect metrics.
- The Metric Rest API endpoints require an authentication token for access. ImmPort Applications call the writeMetric endpoint on the Metric Rest API which takes a metric object.
- The Metric API asynchronously sends the metric object to the Kafka messaging queue. This enables ImmPort Applications to log the metric and immediately return. The method in the ImmPort Applications to call the metric endpoint is also asynchronous. At no point will the ImmPort Applications be blocked due to logging.
- The Metric API is also a listener to the Kafka messaging queue. As soon as the queue receives a metric object the listener calls the saveMetric endpoint to save the metric to the database.
- A cron job runs every 1 minute to check whether a new metric is saved to the database. If there are metrics these rows are converted to a json object and sent to Elastic search

#### 2.2.14.3. Visualizations in Kibana

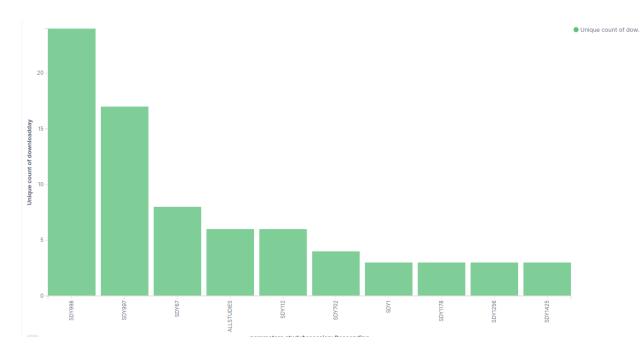
Searching the metric logs and creating usage visualizations becomes easy since the data is stored in Elasticsearch

2.2.14.3.1. Example of the Discovery tab ImmPort Data Browser and ImmPort Data Api usage

ilters 5 Search				KQL	2020 @ 12:56:46.5 → Sep 30, 2020 @ 13:1	3:18.2 C Refr
applicationName is one of immport-	ata-browser-old, immport-data-bro	wser, immport-data-api, immport	t-data-apl-old × ngUser: N × M	NOT remotelpAddress is one of 23.31.210.153,	23.21.25.214 $ imes$ metricType: download $ imes$	
NOT organization is one of esac inc,	blsc, northrop grumman, ng, ng it $ imes$	+ Add filter				
netric_m* ~	0		Aug 1, 2020 @ 12:56:46.506	- Sep 30, 2020 @ 13:13:18.281 — Au	to ~	
lected fields	150 -					_
endPoint	₩ 100-					
organization	100 - 50 -					
parameters.studyAccession						
username	0	2020-08-09 2020-0	08-16 2020-08-23	2020-08-30 2020-09-06 startTime per day	2020-09-13 2020-09-20	2020-09-27
ailable fields 🔅 🔅				start Time per day		
pular	Time 🚽	username	organization	endPoint	parameters.	studyAccession
applicationName	> Sep 30, 2020 @ 12:08	:25.000 marcoang	Children's Hospital o	f Philadelphia ResultFile	es/RNA_sequencing_result SDY998	
downloadday metricType	> Sep 30, 2020 @ 12:08	:21.000 marcoang	Children's Hospital o	f Philadelphia ResultFile	es/RNA_sequencing_result SDY998	
	> Sep 30, 2020 @ 12:04	:18.000 marcoang	Children's Hospital o	f Philadelphia -	SDY998	
parameters.fileCount	> Sep 30, 2020 @ 11:32	:25.000 jkim2345	Fred Hutchinson Cance	r Research Center StudyFile	SDY1	
parameters.size	> Sep 30, 2020 @ 11:32	:02.000 jkim2345	Fred Hutchinson Cance	r Research Center StudyFile:	SDY1	
remotelpAddress	> Sep 30, 2020 @ 11:31	:57.000 Htmonaco	Weill Cornell Medicin	e -	SDY1655	
	> Sep 30, 2020 @ 11:31	:57.000 Htmonaco	Weill Cornell Medicin	e StudyFile:	SDY1655	
1d					SDY1655	
_id _index	> Sep 30, 2020 0 11:31	:57.000 Htmonaco	Weill Cornell Medicin	e ResultFile	5011055	

The figure above shows some of the fields of metrics collected for the data browser and data api, e.g., username, organization,endPoint, study accession. Other fields that can be shown are filename,file count, file size, application name, remote ip address of the user etc.

#### 2.2.14.3.2. Example of the Visualization tab :



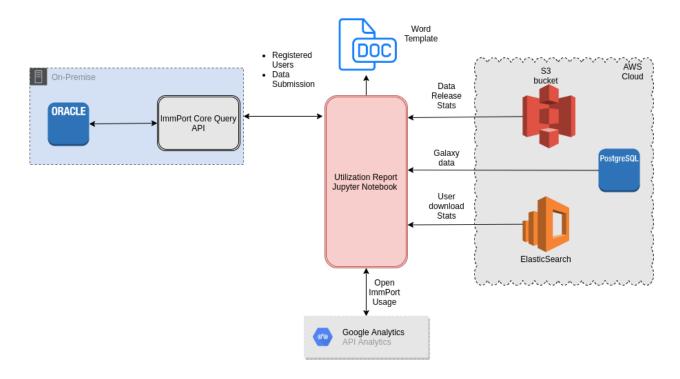
The above figure shows the top ten studies downloaded for the month of September. Various types of visualizations and data can be aggregated in the ElasticSearch and Kibana stack.

### 2.2.15. Utilization Report

We have automated the Monthly ImmPort Utilization Report using Jupyter Notebook. A predefined Jinga template has been created and the notebook populates the template with the specifics for that report.

The monthly information is currently pulled from either:

- The ImmPort Core Query API
- AWS Elasticsearch
- S3 bucket
- ImmPort Galaxy Postgres
- Google Analytics API



### 2.2.16. ImmPort HAPI FHIR Server

The FHIR project began with a mapping exercise between the fields of the ImmPort basic study design worksheet, used to load new studies into ImmPort, to numerous FHIR resources. We started with FHIR 4.0.1 but found many mappings missing or difficult to map to ResearchStudy. A subsequent review of FHIR 5.0.0 revealed the updates to the ResearchStudy resource made mapping more straightforward. We followed with a comparison of FHIR mappings from other systems (listed below) in an effort to identify variations and preferred approaches.

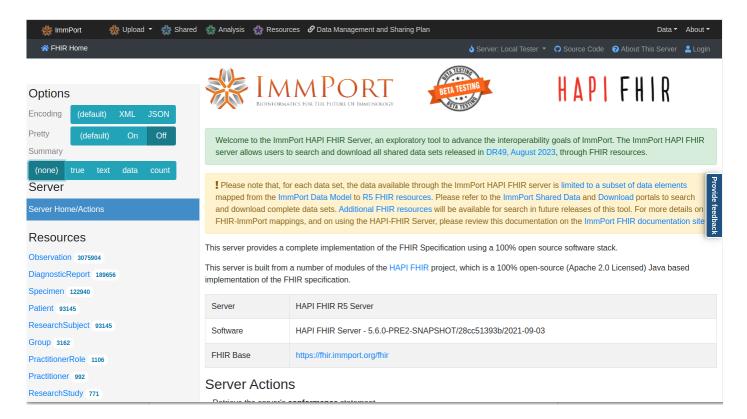
- ClinicalTrials.gov
- FHIR4FAIR
- KidsFirst (which was mapped to FHIR 4.0.1)
- dbGap

The comparison resulted in the identification of key FHIR resources for which we mapped each with as much detail as possible. Please see the attached spreadsheet as well the worksheets named for each FHIR Resource. With this

detailed mapping in hand we developed Python code and Jinja2 templates for generating FHIR JSON resources from the ImmPort Database. The Python code queries the appropriate tables and columns and adds them to a model object used by the Jinja2 templates to populate a skeleton JSON file to generate FHIR resources. A sample of how we mapped a resource is shown below.

Mapping for ResearchStudy Resour	rce			
Using FHIR R5				
Resource Attribute	Complex attribute elements	ImmPort Table	ImmPort Column	Hardcoded Value
	use			official
	type.coding.system			http://terminology.hl7.org/CodeSystem/v2-0203
identifier	type.coding.code			ACSN
	type.coding.display			Accession ID
	value	study	study_accession	
version		study	latest_data_release_version	
title		study	official_title	
label	type.coding.code			short
label	value	study	brief_title	
	type			citation
relatedArtifact	label	study_link	name	
	url	study_link	value	
status				active
category	text			Clinical Trial
	coding.system	lk_research_focus	link	
focus	coding.code	lk_research_focus	link	
locus	coding.display	lk_research_focus	name	
	text	lk_research_focus	name	
	coding.system	lk_disease	link	
condition	coding.code	lk_disease	link	
condition	coding.display	study_2_condition_or_disease	condition_preferred	
	text	study_2_condition_or_disease	condition_preferred	
descriptionSummary		study	brief_description	
description		study	description	
objective	name	study	objectives	
sponsor	reference	study	sponsoring_organization	
outcomeMeasure	description	study	endpoints	

A FHIR server was set up, using the open source HAPI FHIR reference implementation, to validate the FHIR resources generated and to make the mapped data easily available for review by others. The Python code was modified to PUT the resources to the FHIR server using ImmPort accession IDs as the ID.



This approach allows users to query the FHIR versions of the ImmPort shared studies and display the completed mappings. Accession IDs allow users to query any given study using the FHIR API and the study accession ID like <a href="https://fhir.immport.org/fhir/ResearchStudy/SDY1">https://fhir.immport.org/fhir/ResearchStudy/SDY1</a>

This result is being rendered in HTML for easy viewing. You may access this content as Raw JSON or Raw XML or Raw Turtle or view this content in HTML JSON or HTML XML or HTML Turtle . Response generated in 47ms.

HTTP 200 OK

**Response Headers** 

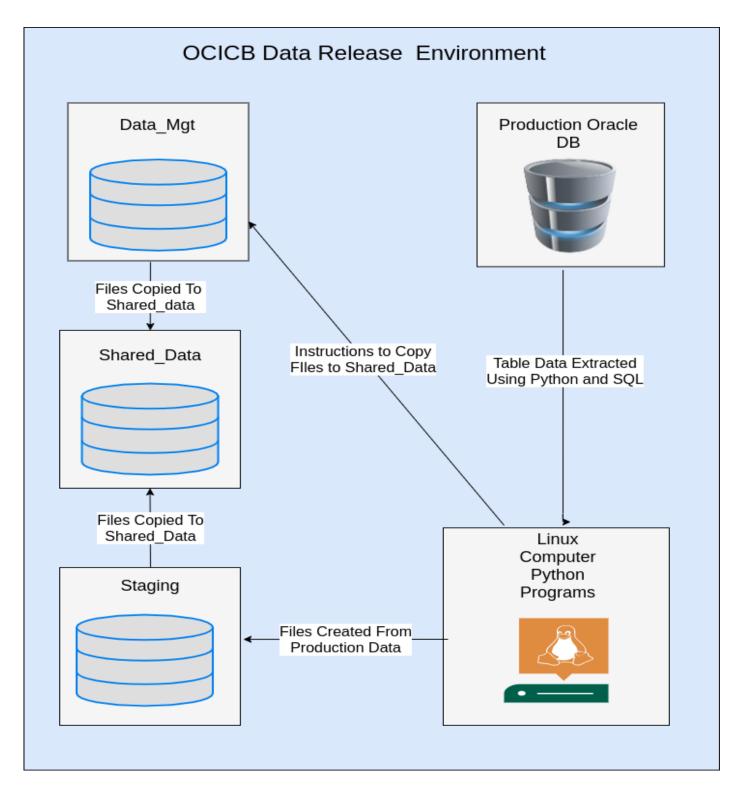
```
X-Cache: HIT from https://fhir.immport.org/fhir
X-Powered-By: HAPI FHIR 5.6.0-PRE2-SNAPSHOT/28cc51393b/2021-09-03 REST Server (FHIR Server; FHIR 4.6.0/R5)
X-Request-ID: V85K45P03PvTW7
Response Body
                {
                   "resourceType": "Bundle",
"id": "7dfceefb-c138-4e4a-a172-6bb914f7a664",
                    "meta": {
    "lastUpdated": "2023-10-30T16:23:52.782+00:00'
                    },
"type": "searchset",
"link": [ {
    "relation": "self",
    9
10
                       "url": "https://fhir.immport.org/fhir/ResearchStudy? pretty=true"
    11
12
13
14
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                          elation" "ne
                         viri: "https://fhir.immport.org/fhir?_getpages=7dfceefb-cl38-4e4a-a172-6bb914f7a664&_getpagesoffset=20&_count=20&_pretty=true&_bundletype=searchset"
                       ],
ntry": [ {
    "fullurl": "https://fhir.immport.org/fhir/ResearchStudy/SDY1",
    "resourceType": "ResearchStudy",
    "id": "SDY1",
    "id": "SDY1",
                           id": "SDY1",
"meta": {
"versionId": "1",
"lastUpdated": "2023-08-29T13:23:35.444+00:00",
"source": "#JR4ggflAUYaSwcKP"
                          },
"identifier": [ {
    "use": "official",
                              User: "official",
"type": {
    "coding": [ {
    "system": "http://terminology.hl7.org/CodeSystem/v2-0203",
    "code": "ACSN",
    "display": "Accession ID"

    32
33
34
                             },
"value": "SDY1"
{
```

# 2.3. Data Release

The ImmPort team currently produces 4 to 6 data releases per year. With each release additional studies are made publicly available as well as updates made to previously existing shared studies. The process involves using computers, data in file systems and an Oracle database in the NIAID OCICB environment, as well as an AWS Aurora MySQL instance, S3 buckets, and software in the ImmPort AWS environment. The current contract mandates the production database and data uploaded to ImmPort be hosted in the NIAID OCICB facility.

### 2.3.1. Overview of OCICB Components and Process

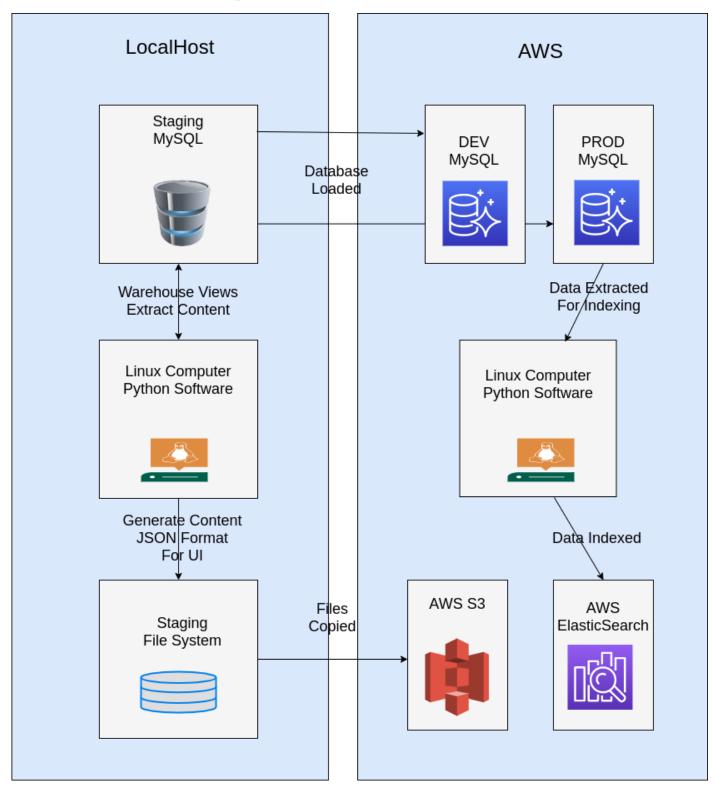


Steps to perform a data release are depicted above and outlined below. In this section we focus on how Study packages, including the ALLSTUDIES package, are created as part of the data release process. We will not discuss the initial step, executed by the Data Curation team, that identifies which studies are ready for public data sharing.

1. Create a DOI using the DataCite platform for new shared studies. New DOIs are uploaded to the production database.

- 2. A Python process is run to construct the ALLSTUDIES package that includes all shared studies bundled into a package suitable for loading into a MySQL database. The process runs on the Linux server and executes code to extract information from the Oracle database which is used to create the ALLSTUDIES package. The files created by this process are placed in the Staging file system.
- 3. The ALLSTUDIES package is used to populate a local MySQL database. This process ensures data extracted matches the data we expect to be extracted for the data release. QC steps run scripts to measure whether table row counts have increased from the previous release to the current release. Another script checks whether the table structure of the previous data release matches the table structure of the current release, etc. The primary QC check occurs when foreign keys are applied for each table as the final step in building the MySQL database. If data has not been extracted properly foreign key violations arise requiring review before the data release process can continue. The ALLSTUDIES package is placed in the Staging file system.
- 4. Once ALLSTUDIES data have been extracted properly another Python process is executed to extract information from the Oracle database and construct an individual package for each study. During this step result files for the new studies are copied from the Data\_Mgt file system to the Shared\_Data file system. The study packages are placed in the Staging file system.
- 5. On the day of the release the current contents for the previous release are moved into their respective **archive directory** on the Shared\_Data file system. New content generated by Step 3 and Step 4 are moved into the base directory on the Shared\_Data file system for each study including the ALLSTUDIES package.
- 6. The Final step is to run the Python process to update the DataBrowser content making the new release files available for public download

### 2.3.2. Overview of AWS Components and Process



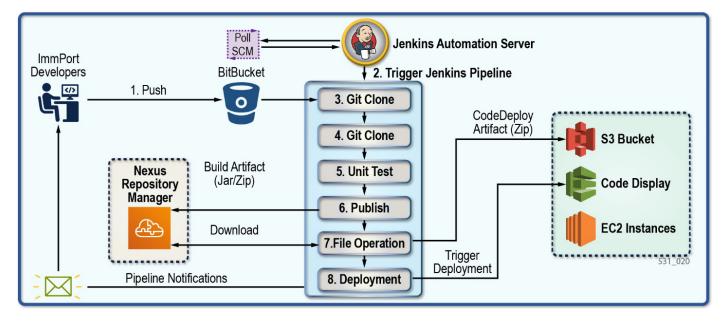
Steps to perform a data release are depicted above and outlined below. This section focuses on the production database and how files to support UI and ElasticSearch content are generated and deployed for use by API and UI.

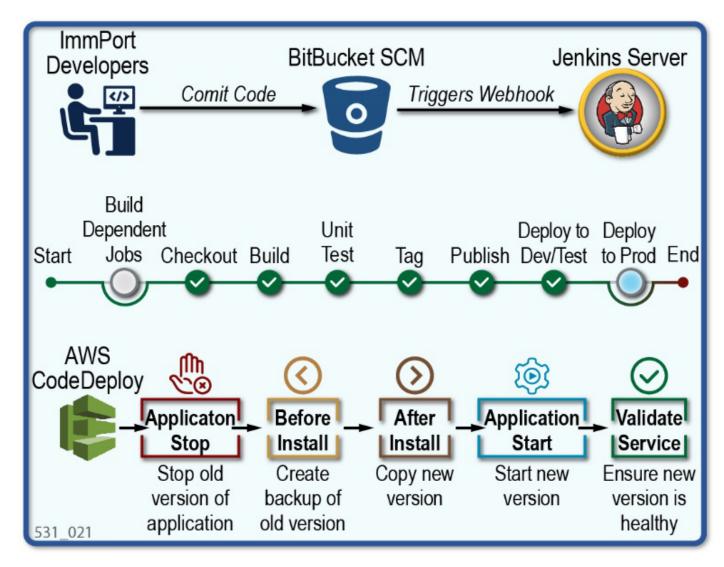
- 1. Several views and materialized tables are created on top of the MySQL Shared\_Data database to support the UI and API.
- 2. When step 1 has been completed, the warehouse version of the database is copied and loaded into the DEV and Production MySQL Aurora databases on AWS.
- 3. The next step is to generate JSON files containing static content for use by the UI, to display graphics, data release notes, and to support indexing by Google for improved search engine optimization.
- 4. Files generated in step 3 are copied to the development AWS S3 buckets for QC testing and then, on the day of the data release, copied to the production AWS S3 buckets.
- 5. A similar process is used to extract information from the MySQL database to prepare and load this information into ElasticSearch. The development environment is loaded for QC testing and, on the day of the data release, the production environment is loaded and indexed.
- 6. Another process is run to generate content to support site search which is also indexed using ElasticSearch.

# 2.4. ImmPort Continuous Integration and Continuous Delivery (CICD)

CI/CD pipelines are the first prerequisites of cloud-native microservices architecture development. Continuous Integration (CI) enables continuous integration of source code into a single shared and easy to access repository. Continuous Delivery (CD) enables continuous delivery of the code stored in the repository to production. CI/CD creates a fast and effective process for getting a product to market and for releasing new features and bug fixes. These pipelines also enable organizations to bridge the gap between developers and customers efficiently and to create reliable, robust, and scalable applications.

The figure below depicts the CICD implementation architecture for the ImmPort applications hosted in the AWS environments. This architecture applies to the AWS and NIAID development applications hosted in AWS and AWS production applications hosted in AWS. Currently, the production and quality assurance applications at NIAID are deployed manually, and ImmPort is actively working on setting up another similar CICD architecture at the NIAID facility. We have installed standalone Jenkins servers in the development and production environments to run the CICD pipelines to build, test, tag, publish, and deploy to EC2 instance using AWS managed CodeDeploy service.





The figure above depicts a typical CICD pipeline for an ImmPort application. The standalone Jenkins server continuously polls for any code changes in the source code git repositories and triggers the underlying CICD pipeline for that repository. The pipeline then clones the source code and builds and runs the unit tests. On successful execution of the unit tests, the repository is tagged and a release artifact pushed to the Nexus artifact repository. Also, a Docker image is built and pushed to the Amazon Elastic Container Registry (ECR) for applications deployed as docker containers. The pipeline then deploys the artifact or the Docker image to the appropriate EC2 instance where the AWS CodeDeploy agent listens for instruction from the CodeDeploy service configured in the Jenkins plugin. Finally, the ImmPort application deploys onto the EC2 instance and the application restarts.

# 3. ImmPort OCICB

# 3.1. OVERVIEW

Most ImmPort public-facing applications are hosted using AWS infrastructure whereas operational applications and databases are hosted by the Office of Cyber Infrastructure and Computational Biology(OCICB), which manages

technologies supporting NIAID biomedical research programs. Since 2011 the OCICB and ImmPort teams have collaborated in the deployment and maintenance of applications in support of ImmPort operational activities.

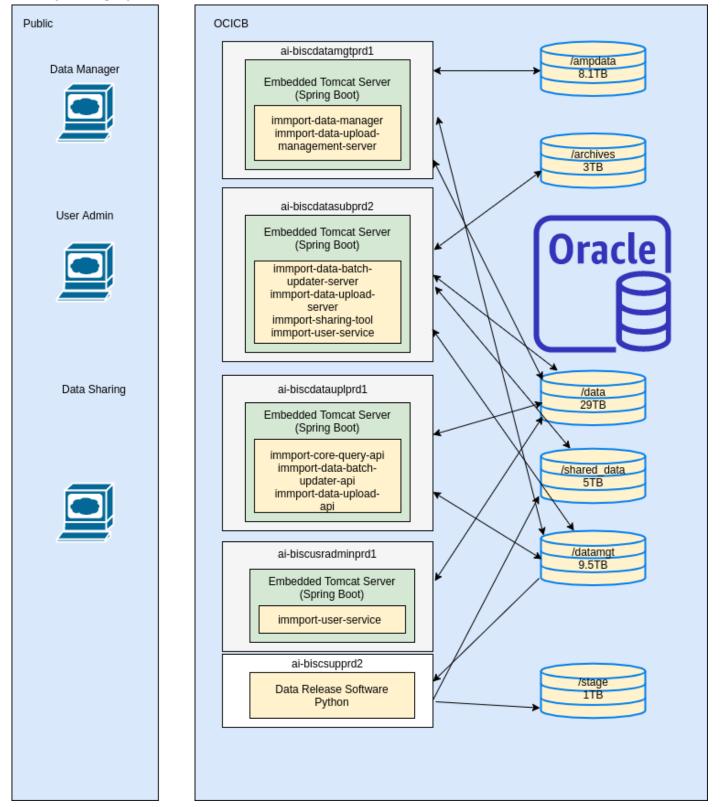
The OCICB infrastructure supports Production and QA environments. Applications hosted at NIAID are primarily focused on upload, management, QC, and curation of private data sets under embargo. This ensures private data sets have the highest level of security and access controls, provided by the NIAID facility during the embargo period when access to the data needs to be restricted to a limited set of users. When research and clinical data have been curated and released from the embargo and shared with the larger user community, these data continue to be made available to registered users using the Amazon Web Services (AWS) infrastructure.

### 3.1.1. Feature Summary

#	Capabilities/Features	Capability/Feature Description
1	User Administration	System administration capabilities include allowing users to request system access (register), approve registration requests, create user accounts, update user information, query user information, and deactivate users.
2	Log In/Off	Authentication and authorization capabilities including allowing users to login, logoff, and retrieve login information when the account or password is forgotten.
3	Manage NIAID/DAIT Programs	Contract/grant management capabilities including creating, searching, deleting, modifying, and viewing contracts and grants and assigning a PI for a contract or grant
4	Manage Research Project (RP) /Private Project Workspace (PPW)	Manage Research Projects (RP) including allowing a user designated as a PI or PM on a grant to create a project and it's associated RP and update the information associated with the project, manage user access to the RP.
5	Manage Collaborative Project (CP)	Manage the CP capabilities including allowing a user designated as a PI or PM on a contract or grant to create a CP, update the information associated with the CP, control user access to the CP, and share datasets in a CP.
6	Data Submission	Batch loading of experimental data into a RP for multiple types of relevant metadata to provide the minimum information for multiple experimental assay types.
	Data Update	Bulk editing of data
	Data Management	UI application for managing data
	Data Sharing	UI application to control the release of study information for public distribution
	Database Audit History and Archiving	Maintain a complete audit history of research data (including analysis toolset data created) that is both updated and deleted. The audit history is defined as the ability to capture "who", "what", and "when" of the data involved in a change or deletion to Research data contained in the ImmPort System. Additionally, audit and collect limited summary information with respect to auditing/tracking of user session activity on a limited number of database areas. The focus is to obtain summary information on system activity such as logins, information created and updated in the several areas of the Administration Module, and usage of baseline Analysis Tools. Additionally, provide the capability to audit and track user session log information.
	Core Query API	Provides programmatic access to the Core ImmPort Data

# **3.2. OCICB ARCHITECTURE**

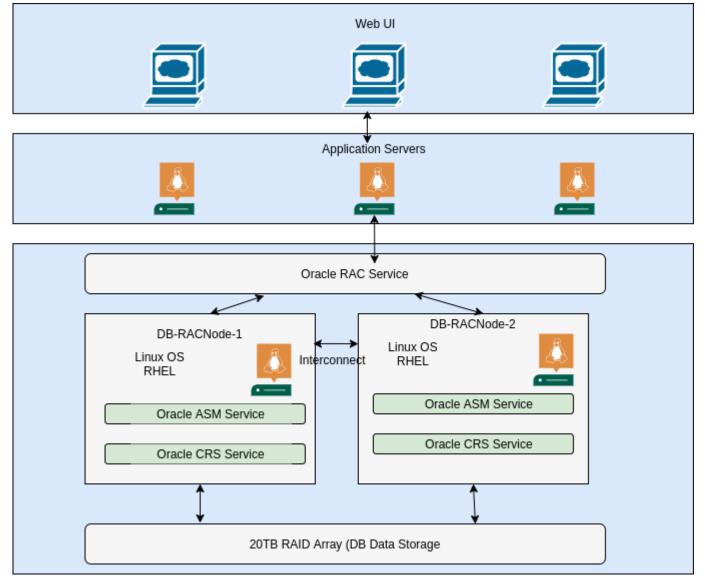
#### Drawing still in progress



# 3.3. DATABASE ARCHITECTURE

The ImmPort system database architecture is stored and maintained in an Oracle 17g Enterprise Edition database utilizing Real Application Clusters (RAC), installed on a Linux EL7 operating system. Installed database options include Oracle Partitioning, On-Line Analytical Processing (OLAP), and Oracle Data Mining (ODM) options. The RAC environment provides necessary system load distribution and load balancing, while at the same time providing system redundancy and failover capabilities.

In RAC, multiple active instances of the database server on different servers or processors can concurrently execute transactions against a shared database. It allows large tasks to be divided into subtasks and distributed among multiple nodes, which provides great efficiency. RAC automatically handles load balancing by distributing the load on multiple nodes and also supports parallel processing of data on multiple nodes. This becomes critical when handling the heavy processing loads required for many of the ImmPort analysis tools, or the large batch upload data submissions. RAC inherently provides high availability by guaranteeing that the database system is operational as long as one node in the cluster is up, and reliability by providing user-transparent transaction fail-over.



# 3.3.1. CORE\_IMMPORT

#### 3.3.1.1. Overview

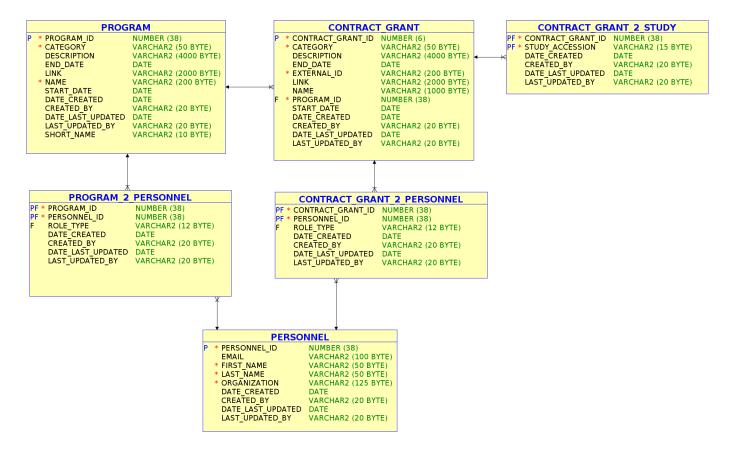
The CORE\_IMMPORT database is the primary operational database where all read/write activity occurs. Almost all tables in this database include audit/editorial columns that track: date\_created, created\_by, data\_last\_updated and last\_updated\_by. In addition, the CORE\_IMMPORT database is mirrored by the CORE\_IMMPORT\_HIST database, which tracks edits made to the tables in the CORE\_IMMPORT database.

#### 3.3.1.2. Workspace

The workspace tables are important components for the process of releasing private studies to the public. In addition, they are used to control which users have access to individual rows in the database and the **workspace\_2\_user** supports access control to a workspace and all the objects linked to that workspace. In the workspace table there is a special workspace with workspace\_id equal to zero. When rows from the base tables are released to the public as part of the Data Release sharing process, rows for the objects being released are inserted into the workspace\_2\_XXX table, with the workspace\_id set to zero. This allows the ImmPort Data Release process to use views that make sure only rows in the base tables, linked to the workspace\_2\_XXX table, are included in the output.

		SPACE 2 SUBJECT
WORKSPACE_2_ASSESSMENT_PANEL	WORKSPACE         TREATMENT         WORK           PF * WORKSPACE         ID         NUMBER (38)         PF * WORKSPACE_ID	NUMBER (38)
PF * WORKSPACE_ID NUMBER (38)	PF * TREATMENT ACCESSION VARCHAR2 (15 BYTE) PF * SUBJECT_ACCESSI	
PF * ASSESSMENT_PANEL_ACCESSION VARCHAR2 (15 BYTE)	UPLOAD TICKET NUMBER VARCHAR2 (100 BYTE) UPLOAD_TICKET_N	
UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE)	DATE CREATED DATE DATE DATE CREATED	DATE
DATE_CREATED DATE	CREATED BY VARCHAR2 (20 BYTE) CREATED_BY	VARCHAR2 (20 BYTE)
CREATED_BY VARCHAR2 (20 BYTE)	DATE LAST UPDATED DATE DATE DATE DATE LAST_UPDATE	
DATE LAST UPDATED DATE	LAST UPDATED BY VARCHAR2 (20 BYTE) LAST_UPDATED_B	
LAST_UPDATED_BY VARCHAR2 (20 BYTE)	CAST_OFDATED_BT VARCHAR2 (20 BTTE)	
*	Y WOR	KSPACE 2 STUDY
WORKSPACE_2_BIOSAMPLE	PF * WORKSPACE ID	NUMBER (38)
PF * WORKSPACE ID NUMBER (38)	WORKSPACE 2 USER PF * STUDY ACCESSIO	
PF * BIOSAMPLE_ACCESSION VARCHAR2 (15 BYTE)	PF * WORKSPACE ID NUMBER (38) UPLOAD_TICKET_N	UMBER VARCHAR2 (100 BYTE)
UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE)	P * USERNAME VARCHAR2 (20 BYTE) DATE_CREATED	DATE
DATE_CREATED DATE	DATE CREATED DATE CREATED_BY	VARCHAR2 (20 BYTE)
CREATED_BY VARCHAR2 (20 BYTE)	CREATED BY VARCHAR2 (20 BYTE) DATE_LAST_UPDA	TED DATE
DATE_LAST_UPDATED DATE	DATE LAST UPDATED DATE LAST_UPDATED_B	Y VARCHAR2 (20 BYTE)
LAST_UPDATED_BY VARCHAR2 (20 BYTE)	LAST UPDATED BY VARCHAR2 (20 BYTE)	
×	WORKSPAC	CE 2 STANDARD CURVE
WORKSPACE 2 CONTROL SAMPLE	PF * WORKSPACE ID	NUMBER (38)
PF * WORKSPACE ID NUMBER (38)		ACCESSION VARCHAR2 (15 BYTE)
PF * CONTROL SAMPLE ACCESSION VARCHAR2 (15 BYTE)	UPLOAD TICKET	
UPLOAD TICKET NUMBER VARCHAR2 (100 BYTE)	DATE CREATED	DATE
DATE CREATED DATE	CREATED BY	VARCHAR2 (20 BYTE)
CREATED BY VARCHAR2 (20 BYTE)	WORKSPACE DATE_LAST_UPDA	
DATE LAST UPDATED DATE		
LAST UPDATED BY VARCHAR2 (20 BYTE)	P * WORKSPACE_ID NUMBER (38)     * CATEGORY VARCHAR2 (50 BYTE)	
	* NAME VARCHAR2 (30 BYTE) WORK	SPACE 2 REAGENT
WORKSPACE 2 CONTRACT CRANT	* TYPE VARCHAR2 (20 BYTE) PF * WORKSPACE ID	NUMBER (38)
WORKSPACE_2_CONTRACT_GRANT	DATE CREATED DATE PF * REAGENT ACCES	
PF * WORKSPACE_ID NUMBER (38)		NUMBER VARCHAR2 (100 BYTE)
PF * CONTRACT_GRANT_ID_NUMBER (38)	DATE LAST UPDATED DATE DATE DATE CREATED	DATE
DATE_CREATED DATE	LAST UPDATED BY VARCHAR2 (20 BYTE) CREATED BY	VARCHAR2 (20 BYTE)
CREATED_BY VARCHAR2 (20 BYTE)	DATE LAST UPDA	
DATE_LAST_UPDATED DATE		Y VARCHAR2 (20 BYTE)
LAST_UPDATED_BY VARCHAR2 (20 BYTE)		. =,
		SPACE_2_PROTOCOL
	PF * WORKSPACE_ID	NUMBER (38)
PF * WORKSPACE_ID NUMBER (38)	PF * PROTOCOL_ACCE	
PF * EXPERIMENT_ACCESSION_VARCHAR2 (15 BYTE)		NUMBER VARCHAR2 (100 BYTE)
UPLOAD_TICKET_NUMBER_VARCHAR2 (100 BYTE) DATE_CREATEDDATE_	DATE_CREATED	DATE
DATE_CREATED DATE CREATED BY VARCHAR2 (20 BYTE)	CREATED_BY	VARCHAR2 (20 BYTE)
DATE LAST UPDATED DATE	DATE_LAST_UPD/	
LAST UPDATED BY VARCHAR2 (20 BYTE)	LAST_UPDATED_E	BY VARCHAR2 (20 BYTE)
	*	
WORKSPACE 2 EXPSAMPLE		CE_2_LAB_TEST_PANEL
	PF * WORKSPACE_ID NUMBER (38) PF * WORKSPACE_ID	NUMBER (38)
WORKSPACE 2 EXPSAMPLE PF * WORKSPACE_ID NUMBER (38)	PF * WORKSPACE_ID NUMBER (38) PF * WORKSPACE_ID PF * FILE_INFO_ID NUMBER (38) PF * LAB_TEST_PANEL	NUMBER (38) ACCESSION VARCHAR2 (15 BYTE)
WORKSPACE 2 EXPSAMPLE PF * WORKSPACE ID NUMBER (38) PF * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE)	PF * WORKSPACE ID NUMBER (38) PF * FILE INFO ID NUMBER (38) UPGAD_TICKET_NUMBER VARCHAR2 (100 BYTE) UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE)	NUMBER (38) ACCESSION VARCHAR2 (15 BYTE)
WORKSPACE_2 EXPSAMPLE PF * WORKSPACE_ID NUMBER (38) PF * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE) UPLOAD_TICKET_NUMBER_VARCHAR2 (100 BYTE)	PF * WORKSPACE_ID NUMBER (38) PF * FILE INFO ID NUMBER (38) UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) DATE CREATED DATE DATE	NUMBER (38) ACCESSION VARCHAR2 (15 BYTE) NUMBER VARCHAR2 (100 BYTE) DATE
WORKSPACE         2         EXPSAMPLE           PF * WORKSPACE ID         NUMBER (38)           PF * EXPSAMPLE ACCESSION         VARCHAR2 (15 BYTE)           UPLOAD TICKET NUMBER         VARCHAR2 (100 BYTE)           DATE_CREATED         DATE	PF * WORKSPACE_ID NUMBER (38) PF * FILE_INFO_ID NUMBER (38) UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) CREATED_BY CREATED_BY	ACCESSION VARCHAR2 (15 BYTE) NUMBER VARCHAR2 (15 BYTE) DATE VARCHAR2 (20 BYTE)
WORKSPACE 2 EXPSAMPLE PF * WORKSPACE ID NUMBER (38) PF * EXPSAMPLE ACCESSION VARCHAR2 (15 BYTE) UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE)	PF * WORKSPACE_ID     NUMBER (38)     PF * WORKSPACE_ID       PF * ILE_INFO_ID     NUMBER (38)     PF * LAB TEST_PANEL       UPLOAD_TICKET_NUMBER     VARCHAR2 (100 BYTE)     PF * LAB TEST_PANEL       DATE_CREATED     DATE     CREATED       CREATED_BY     VARCHAR2 (20 BYTE)     CREATED BY       DATE_LAST_UPDATE     DATE     DATE_LAST_UPDATE	ACCESSION VARCHAR2 (135 BYTE) NUMBER VARCHAR2 (15 BYTE) DATE VARCHAR2 (100 BYTE) DATE VARCHAR2 (20 BYTE) TED DATE
WORKSPACE 2 EXPSAMPLE PF * WORKSPACE ID NUMBER (38) PF * EXPSAMPLE ACCESSION VARCHAR2 (15 BYTE) UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE)	PF * WORKSPACE_ID NUMBER (38) PF * FILE INFO ID NUMBER (38) UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) CREATED_BY CREATED_BY	ACCESSION VARCHAR2 (135 BYTE) NUMBER VARCHAR2 (15 BYTE) DATE VARCHAR2 (100 BYTE) DATE VARCHAR2 (20 BYTE) TED DATE

#### 3.3.1.3. Administrative



### 3.3.1.4. Study

	ARM OR COHORT           P * ARM_ACCESSION         VARCHAR2 (15 BYTE)           DESCRIPTION         VARCHAR2 (4000 BYTE)           NAME         VARCHAR2 (126 BYTE)           TYPE         VARCHAR2 (126 BYTE)           * UPLOAD_TICKET_NUMBER         VARCHAR2 (100 BYTE)           * UPLOAD_TICKET_NUMBER         VARCHAR2 (100 BYTE)           * UPLOAD_TICKET_NUMBER         VARCHAR2 (100 BYTE)	
	UF * WORKSPACE ID NUMBER (38) DATE_CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) ¥	STUDY 2 CONDITION OR DISEASE PF * STUDY ACCESSION VARCHAR2 (15 BYTE)
STUDY PERSONNEL           P * PERSON_ACCESSION         VARCHAR2 (15 BYTE)           * SITE_NAME         VARCHAR2 (100 BYTE)           EMAIL         VARCHAR2 (100 BYTE)           FIRST_NAME         VARCHAR2 (40 BYTE)           HONORIFIC         VARCHAR2 (20 BYTE)           LAST_NAME         VARCHAR2 (20 BYTE)           LAST_NAME         VARCHAR2 (20 BYTE)	STUDY           P * STUDY ACCESSION         VARCHAR2 (15 BYTE)           ACTUAL_COMPLETION_DATE         DATE           ACTUAL_ENROLLMENT         NUMBER (38)           ACTUAL_START_DATE         DATE           * AGE UNIT         VARCHAR2 (25 BYTE)           BRIEF_DESCRIPTION         VARCHAR2 (250 BYTE)           BRIEF_TITLE         VARCHAR2 (250 BYTE)	P * CONDITION REPORTED VARCHAR2 (550 BYTE)     F CONDITION PREFERED VARCHAR2 (250 BYTE)     * UPLOAD TICKET NUMBER VARCHAR2 (200 BYTE)     DATE CREATED DATE     CREATED BY VARCHAR2 (20 BYTE)     DATE LAST_UPDATED DATE     LAST_UPDATED_BY VARCHAR2 (20 BYTE)
ORGĀNIZATION     VARCHAR2 (125 BYTE)       ROLE IN STUDY     VARCHAR2 (10 BYTE)       SUFFIXËS     VARCHAR2 (10 BYTE)       SUFFIXËS     VARCHAR2 (100 BYTE)       * UPLOAD TICKET NUMBER     VARCHAR2 (100 BYTE)       U * USER DËFINED ID     VARCHAR2 (100 BYTE)       U * WORKSPACE ID     NUMBER (38)       DATE CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE CREATED     DATE       LAST_UPDATED     DATE       LAST_UPDATED     DATE       LAST_UPDATED     VARCHAR2 (20 BYTE)       ORCID     VARCHAR2 (100 BYTE)	BRIEF_TITLE     VARCHAR2 (250 BYTE)       CLINICAL_TRIAL     VARCHAR2 (1 BYTE)       CONDITION_STUDIED     VARCHAR2 (1 BYTE)       DCL_ID     NUMBER (38)       DELETE_STUDY     VARCHAR2 (1 BYTE)       DESCRIPTION     CLOB       DOI     VARCHAR2 (1 BYTE)       DOWNLOAD_PAGE_AVAILABLE     VARCHAR2 (1 BYTE)       FINAL_PUBLIC_RELEASE_DATE     DATE       GENDER_INCLUDED     VARCHAR2 (50 BYTE)       HYPOTHESIS     VARCHAR2 (1000 BYTE)       INITIAL DATA RELEASE DATE     DATE	STUDY CATEGORIZATION         P * STUDY CATEGORIZATION_ID         VWMBER (38)         U * RESEARCH FOCUS       VARCHAR2 (50 BYTE)         UF * STUDY ACCESSION       VARCHAR2 (150 BYTE)         UF * STUDY ACCESSION       VARCHAR2 (150 BYTE)         DATE CREATED       DATE         CREATED BY       VARCHAR2 (20 BYTE)         DATE_LAST_UPDATED       DATE         LAST_UPDATED_BY       VARCHAR2 (20 BYTE)
STUDY 2 PROTOCOL  PF * STUDY ACCESSION VARCHAR2 (15 BYTE) PF * PROTOCOL ACCESSION VARCHAR2 (15 BYTE)	INITIAL_DATA_RELEASE_VERSION VARCHAR2 (10 BYTE) INTERVENTION_AGENT VARCHAR2 (1000 BYTE) LATEST_DATA_RELEASE_DATE DATE LATEST_DATA_RELEASE_VERSION VARCHAR2 (10 BYTE) MAXIMUM_AGE VARCHAR2 (40 BYTE) OBJECTIVES CLOB OFFICIAL_TITLE VARCHAR2 (500 BYTE) PLANNED_PUBLIC_RELEASE_DATE DATE SHARED_STUDY VARCHAR2 (15 BYTE) SPONSORING_ORGANIZATION VARCHAR2 (250 BYTE) TARGET_ENROLLMENT NUMBER (38) TYPE VARCHAR2 (500 BYTE)	STUDY GLOSSARY  PF + STUDY_ACCESSION VARCHAR2 (15 BYTE) P + TERM VARCHAR2 (125 BYTE) + DEFINITION VARCHAR2 (125 BYTE) + UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) + UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) DATE_CREATED BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_BY VARCHAR2 (20 BYTE) LAST_UPDATED_BY VARCHAR2 (20 BYTE)
PF * PROTOČOL_ACCESSION     VARCHAR2 (15 BYTE)       * UPLOAD_TICKET_NUMBER     VARCHAR2 (100 BYTE)       DATE_CREATED     DATE       CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)	TYPE VARCHAR2 (50 BYTE) UPLOAD TICKET_NUMBER VARCHAR2 (100 BYTE) U * USER_DËFINED_ID VARCHAR2 (100 BYTE) UF * WORKSPACE ID NUMBER (38) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_BY VARCHAR2 (20 BYTE) LAST_UPDATED_BY VARCHAR2 (20 BYTE)	STUDY FILE           P * STUDY FILE ACCESSION         VARCHAR2 (15 BYTE)           * DESCRIPTION         VARCHAR2 (4000 BYTE)           * PATH         VARCHAR2 (250 BYTE)           * PATH         VARCHAR2 (2600 BYTE)           UF* STUDY_ACCESSION         VARCHAR2 (15 BYTE)           * STUDY_FILE_TYPE         VARCHAR2 (100 BYTE)           * UDY_FILE_TYPE         VARCHAR2 (10 BYTE)
		U * WORKSPÄCE ID NUMBER (38) DATE CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE LAST UPDATED DATE LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE)
STUDY PUBMED           PF * STUDY ACCESSION         VARCHAR2 (15 BYTE)           AUTHOR5         VARCHAR2 (400 BYTE)           DOI         VARCHAR2 (100 BYTE)           JOURNAL         VARCHAR2 (20 BYTE)           JOURNAL         VARCHAR2 (100 BYTE)           MONTH         VARCHAR2 (20 BYTE)           TITLE         VARCHAR2 (100 BYTE)           TITLE         VARCHAR2 (20 BYTE)           VJLOAD TICKET NUMBER         VARCHAR2 (20 BYTE)           * UPLOAD TICKET NUMBER VARCHAR2 (100 BYTE)           * WORKSPACE_ID         NUMBER (38)           YEAR         VARCHAR2 (4 BYTE)	INCLUSION EXCLUSION     CRITERION ACCESSION     VARCHAR2 (15 BYTE)     CRITERION CATEGORY     VARCHAR2 (750 BYTE)     CRITERION CATEGORY     VARCHAR2 (15 BYTE)     STUDY ACCESSION     VARCHAR2 (15 BYTE)     VUPLOAD TICKET NUMBER     VARCHAR2 (100 BYTE)     VBRC DEFINED ID     VARCHAR2 (100 BYTE)     VBRC DEFINED ID     VARCHAR2 (100 BYTE)     VARCHAR2 (20 BYTE)     DATE_LAST_UPDATED     DATE     VARCHAR2 (20 BYTE)     VARCHAR2 (20 BYTE)     VARCHAR2 (20 BYTE)	STUDY_LINK       P * STUDY_LINK_ID     NUMBER (38)       NAME     VARCHAR2 (500 BYTE)       F * STUDY_ACCESSION     VARCHAR2 (15 BYTE)       TYPE     VARCHAR2 (15 BYTE)       * UPLOAD_TICKET_NUMBER     VARCHAR2 (10 BYTE)       VALUE     VARCHAR2 (10 BYTE)       VALUE     VARCHAR2 (10 BYTE)       VARCHAR2 (10 BYTE)     VARCHAR2 (10 BYTE)       VARCHAR2 (20 BYTE)     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)
CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE)		

### 3.3.1.5. Subject

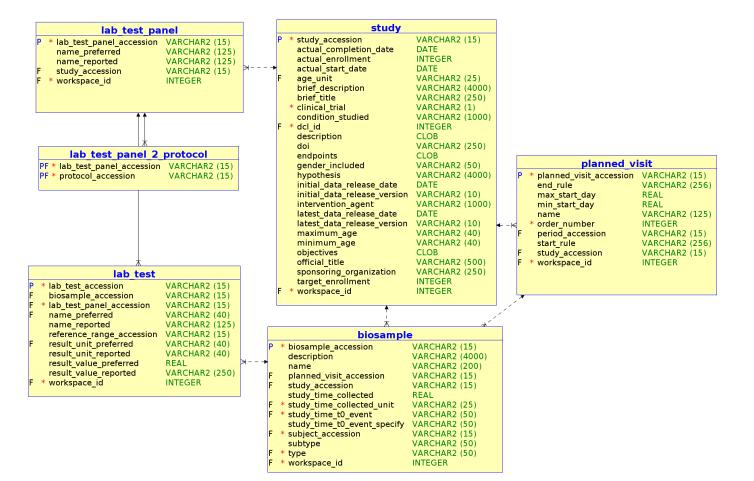
	ARM_2_SUBJECT	
	PF * ARM_ACCESSION VARCHAR2 (15 I	
IMMUNE EXPOSURE	PF * SUBJECT_ACCESSION VARCHAR2 (15 I	
P * EXPOSURE ACCESSION VARCHAR2 (15 BYTE)	* AGE_EVENT VARCHAR2 (50 I	
F * ARM ACCESSION VARCHAR2 (15 BYTE)	AGE_EVENT_SPECIFY VARCHAR2 (50 I * AGE UNIT VARCHAR2 (50 I VARCHAR2 (50 I	
F * SUBJECT_ACCESSION VARCHAR2 (15 BYTE)	MAX SUBJECT AGE NUMBER	NAME VARCHARZ (200 BTTE)
* EXPOSURE_PROCESS_REPORTED VARCHAR2 (100 BYTE)	MIN_SUBJECT_AGE NUMBER	F PLANNED_VISIT_ACCESSION VARCHAR2 (15 BYTE)
EXPOSURE_PROCESS_PREFERRED VARCHAR2 (100 BYTE)	SUBJECT_PHENOTYPE VARCHAR2 (200	F STUDY_ACCESSION VARCHAR2 (15 BYTE)
EXPOSURE_MATERIAL_REPORTED VARCHAR2 (200 BYTE)	* UPLOAD_TICKET_NUMBER_VARCHAR2 (100	D BYTE) STUDY_TIME_COLLECTED NUMBER
EXPOSURE_MATERIAL_PREFERRED_VARCHAR2 (200 BYTE)	DATE_CREATED DATE	* STUDY_TIME_COLLECTED_UNIT VARCHAR2 (25 BYTE) * STUDY_TIME_T0_EVENT VARCHAR2 (50 BYTE)
EXPOSURE_MATERIAL_ID VARCHAR2 (100 BYTE) DISEASE REPORTED VARCHAR2 (550 BYTE)	CREATED_BY VARCHAR2 (20 I	BYTE) STUDY_TIME_TO_EVENT_SPECIFY_VARCHAR2 (50 BYTE)
DISEASE_PREFERRED VARCHAR2 (250 BYTE)	DATE_LAST_UPDATED DATE	E * SUBJECT ACCESSION V/ARCHAR2 (15 BYTE)
DISEASE_ONTOLOGY_ID VARCHAR2 (100 BYTE)	LAST_UPDATED_BY VARCHAR2 (20 I	DITE VARCHAR2 (50 BYTE)
DISEASE_STAGE_REPORTED VARCHAR2 (100 BYTE)	SUBJECT_LOCATION VARCHAR2 (50 I	* TYPE VARCHAR2 (50 BYTE)
DISEASE_STAGE_PREFERRED VARCHAR2 (50 BYTE)	w w	* UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE)
* UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE)	Ĭ	U * USER_DEFINED_ID VARCHAR2 (100 BYTE)
DATE_CREATED DATE	SUBJECT	UF* WORKSPACE_ID NUMBER (38)
CREATED_BY VARCHAR2 (20 BYTE)		DATE_CREATED DATE
DATE_LAST_UPDATED DATE	P * SUBJECT_ACCESSION VARCHAR2 (15 BY ANCESTRAL POPULATION VARCHAR2 (100 B	
LAST_UPDATED_BY VARCHAR2 (20 BYTE)	DESCRIPTION VARCHAR2 (4000	
	ETHNICITY VARCHAR2 (50 BY	
	* GENDER VARCHAR2 (20 BY	
	RACE VARCHAR2 (50 BY	
	RACE_SPECIFY VARCHAR2 (1000	
ASSESSMENT_COMPONENT	* SPECIES VARCHAR2 (50 BY	
P * ASSESSMENT_COMPONENT_ACCESSION_VARCHAR2 (15 BYTE)	STRAIN VARCHAR2 (50 BY	
AGE_AT_ONSĒT_PREFERRED NUMBER AGE_AT_ONSET_REPORTED VARCHAR2 (100 BYTE)	STRAIN_CHARACTERISTICS VARCHAR2 (500 B	
AGE_AT_ONSET_REPORTED VARCHAR2 (100 BTTE)	* UPLOAD_TICKET_NUMBER VARCHAR2 (100 B U * USER DEFINED ID VARCHAR2 (100 B	
AGE AT ONSET UNIT REPORTED VARCHAR2 (25 BYTE)	UF * WORKSPACE_ID NUMBER (38)	* COMPOUND_ROLE VARCHAR2 (40 BYTE)
F * ASSESSMENT PANEL ACCESSION VARCHAR2 (15 BYTE)	DATE CREATED DATE	DOSE NUMBER
IS_CLINICALLY_SIGNIFICANT VARCHAR2 (1 BYTE)	CREATED_BY VARCHAR2 (20 BY	(TE) DOSE_FREQ_PER_INTERVAL VARCHAR2 (40 BYTE)
LOCATION_OF_FINDING_PREFERRED VARCHAR2 (256 BYTE)	DATE_LAST_UPDATED DATE	DOSE_REPORTED VARCHAR2 (150 BTTE)
LOCATION_OF_FINDING_REPORTED VARCHAR2 (256 BYTE)	LAST_UPDATED_BY VARCHAR2 (20 BY	YTE) DOSE_UNITS VARCHAR2 (40 BYTE) DURATION UNIT VARCHAR2 (10 BYTE)
NAME_PREFERRED VARCHAR2 (150 BYTE)		END TIME VARCHAR2 (10 BTTE)
* NAME_REPORTED VARCHAR2 (150 BYTE)	Ī	FORMULATION VARCHAR2 (125 BYTE)
ORGAN_OR_BODY_SYSTEM_PREFERRED_VARCHAR2 (100 BYTE)		IS ONGOING VARCHAR2 (40 BYTE)
ORGAN_OR_BODY_SYSTEM_REPORTED VARCHAR2 (100 BYTE) F * PLANNED VISIT ACCESSION VARCHAR2 (15 BYTE)		NAME PREFERRED VARCHAR2 (40 BYTE)
F REFERENCE RANGE ACCESSION VARCHAR2 (15 BTTE)		* NAME_REPORTED VARCHAR2 (125 BYTE)
RESULT UNIT PREFERRED VARCHAR2 (40 BYTE)		REPORTED_INDICATION VARCHAR2 (255 BYTE)
RESULT UNIT REPORTED VARCHAR2 (40 BYTE)		ROUTE_OF_ADMIN_PREFERRED_VARCHAR2 (40 BYTE)
RESULT VALUE CATEGORY VARCHAR2 (40 BYTE)		ROUTE_OF_ADMIN_REPORTEDVARCHAR2 (40 BYTE)
RESULT_VALUE_PREFERRED NUMBER		START_TIME VARCHAR2 (40 BYTE)
RESULT_VALUE_REPORTED VARCHAR2 (250 BYTE)	ADVENSE_EVENT_ACCESSION VANCHARZ	STATUS         VARCHAR2 (40 BYTE)           2 (15 BYTE)         F * STUDY_ACCESSION         VARCHAR2 (15 BYTE)
STUDY_DAY NUMBER		2 (250 BYTE) F * STUDY_ACCESSION VARCHAR2 (15 BYTE) 2 (4000 BYTE) F * SUBJECT_ACCESSION VARCHAR2 (15 BYTE)
F * SUBJECT_ACCESSION VARCHAR2 (15 BYTE)	END STUDY DAY NUMBER	* UPLOAD TICKET NUMBER VARCHAR2 (100 BYTE)
SUBJECT_POSITION_PREFERRED VARCHAR2 (40 BYTE) SUBJECT_POSITION_REPORTED VARCHAR2 (40 BYTE)		2 (40 BYTE) U * USER_DEFINED_ID VARCHAR2 (200 BYTE)
TIME OF DAY VARCHAR2 (40 BYTE)	LOCATION OF REACTION PREFERRED VARCHAR2	2 (126 BYTE) UF * WORKSPACE ID NUMBER (38)
* UPLOAD TICKET NUMBER VARCHAR2 (100 BYTE)		2 (126 BYTE) DATE_CREATED DATE
U * USER_DEFINED_ID VARCHAR2 (200 BYTE)		2 (126 BYTE) CREATED_BY VARCHAR2 (20 BYTE)
VERBATIM QUESTION VARCHAR2 (200 BTTE)	NAME_REPORTED VARCHAR2	2 (126 BYTE) DATE_LAST_UPDATED DATE
WHO IS ASSESSED VARCHAR2 (40 BYTE)	ORGAN_OR_BODY_SYSTEM_PREFERRED VARCHAR2	2 (126 BYTE) LAST_UPDATED_BY VARCHAR2 (20 BYTE)
UF* WORKSPACE_ID NUMBER (38)	ORGAN_OR_BODY_SYSTEM_REPORTED_VARCHAR2	2 (126 BYTE) DURATION VARCHAR2 (40 BYTE)
DATE_CREATED DATE		2 (250 BYTE) START_DAY VARCHAR2 (40 BYTE)
CREATED_BY VARCHAR2 (20 BYTE)		2 (40 BYTE) END_DAY VARCHAR2 (40 BYTE)
DATE_LAST_UPDATED DATE	OUTCOME_REPORTED VARCHAR2 RELATION TO NONSTUDY TREATMENT VARCHAR2	2 (40 BYTE)
LAST_UPDATED_BY VARCHAR2 (20 BYTE)		2 (250 BYTE)
		2 (60 BYTE)
		2 (60 BYTE)
	START STUDY DAY NUMBER	
	START TIME VARCHAR2	2 (40 BYTE)
		2 (15 BYTE)
	STUDY_TREATMENT_ACTION_TAKEN VARCHAR2	2 (250 BYTE)
	F * SUBJECT_ACCESSION VARCHAR2	2 (15 BYTE)
	* UPLOAD_TICKET_NUMBER VARCHAR2	2 (100 BYTE)
		2 (150 BYTE)
		20)
	UF * WORKSPACE_ID NUMBER (3 DATE_CREATEDDATE	38)

#### 3.3.1.6. Assessment

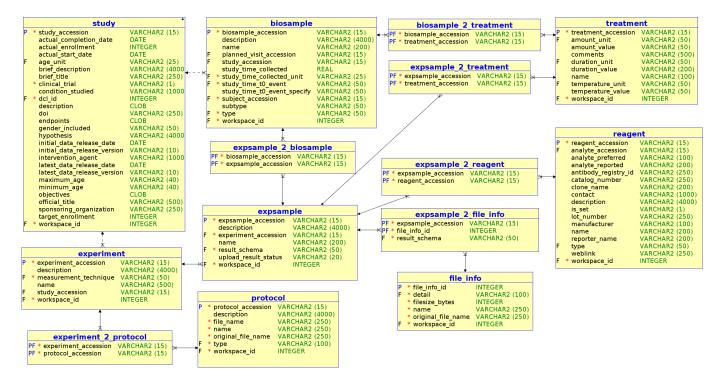
ASSESSMENT	COMPONENT
P * ASSESSMENT_COMPONENT_ACCESSION	
AGE_AT_ONSET_PREFERRED	NUMBER
AGE_AT_ONSET_REPORTED	VARCHAR2 (100 BYTE)
AGE_AT_ONSET_UNIT_PREFERRED AGE_AT_ONSET_UNIT_REPORTED	VARCHAR2 (40 BYTE) VARCHAR2 (25 BYTE)
F * ASSESSMENT_PANEL_ACCESSION	VARCHAR2 (15 BYTE)
IS CLINICALLY SIGNIFICANT	VARCHAR2 (1 BYTE)
LOCATION_OF_FINDING_PREFERRED	VARCHAR2 (256 BYTE)
LOCATION_OF_FINDING_REPORTED	VARCHAR2 (256 BYTE)
NAME_PREFERRED	VARCHAR2 (150 BYTE)
* NAME_REPORTED ORGAN OR BODY SYSTEM PREFERRED	VARCHAR2 (150 BYTE) VARCHAR2 (100 BYTE)
ORGAN_OR_BODY_SYSTEM_REPORTED	VARCHAR2 (100 BYTE)
F * PLANNED VISIT ACCESSION	VARCHAR2 (15 BYTE)
F REFERENCE RANGE ACCESSION	VARCHAR2 (15 BYTE)
RESULT_UNIT_PREFERRED	VARCHAR2 (40 BYTE)
RESULT_UNIT_REPORTED	VARCHAR2 (40 BYTE)
RESULT_VALUE_CATEGORY RESULT_VALUE_PREFERRED	VARCHAR2 (40 BYTE)
RESULT_VALUE_REPORTED STUDY DAY	VARCHAR2 (250 BYTE) NUMBER
F * SUBJECT_ACCESSION	VARCHAR2 (15 BYTE)
SUBJECT_POSITION_PREFERRED	VARCHAR2 (40 BYTE)
SUBJECT_POSITION_REPORTED	VARCHAR2 (40 BYTE)
TIME_OF_DAY	VARCHAR2 (40 BYTE)
* UPLOAD_TICKET_NUMBER	VARCHAR2 (100 BYTE)
	VARCHAR2 (200 BYTE)
VERBATIM_QUESTION	VARCHAR2 (250 BYTE)
WHO_IS_ASSESSED UF * WORKSPACE ID	VARCHAR2 (40 BYTE) NUMBER (38)
DATE_CREATED	DATE
CREATED BY	VARCHAR2 (20 BYTE)
DATE_LAST_UPDATED	DATE
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
ţ	
ASSESSMENT	
P * ASSESSMENT_PANEL_ACCESSIO	
ASSESSMENT TYPE	VARCHAR2 (125 BYTE)
	VARCHAR2 (125 BYTE)
NAME_PREFERRED	VARCHAR2 (125 BYTE) VARCHAR2 (125 BYTE)
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE)
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE)
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE)
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE)
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF* WORKSPACE_ID	VARCHAR2 (125 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (40 BYTE)           VARCHAR2 (15 BYTE)           VARCHAR2 (100 BYTE)           VARCHAR2 (100 BYTE)           VARCHAR2 (100 BYTE)           VARCHAR2 (38)
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF WORKSPACE_ID DATE_CREATED	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE)
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF* WORKSPACE_ID	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) DATE
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF* WORKSPACE_ID DATE_CREATED CREATED_BY	VARCHAR2 (125 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (40 BYTE)           VARCHAR2 (15 BYTE)           VARCHAR2 (100 BYTE)           VARCHAR2 (20 BYTE)
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF* WORKSPACE_ID DATE_CREATED_BY CREATED_BY DATE_LAST_UPDATED	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) DATE VARCHAR2 (20 BYTE) DATE
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF* WORKSPACE_ID DATE_CREATED_BY CREATED_BY DATE_LAST_UPDATED	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) DATE VARCHAR2 (20 BYTE) DATE
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF* WORKSPACE_ID DATE_CREATED_BY CREATED_BY DATE_LAST_UPDATED	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) DATE VARCHAR2 (20 BYTE) DATE
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF* WORKSPACE_ID DATE_CREATED_BY CREATED_BY DATE_LAST_UPDATED	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) DATE VARCHAR2 (20 BYTE) DATE
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF* WORKSPACE_ID DATE_CREATED_BY CREATED_BY DATE_LAST_UPDATED	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) DATE VARCHAR2 (20 BYTE) DATE
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION UPLOAD_TICKET_NUMBER U * USER_DĒFINED_ID UF* WORKSPACE_ID DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)
NAME_PREFERED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD TICKET_NUMBER U * USER_DÉFINED_ID UF WORKSPACE_ID DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	VARCHAR2 (125 BYTE) VARCHAR2 (30 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) FILE INFO
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION UPLOAD_TICKET_NUMBER U * USER_DĒFINED_ID UF* WORKSPACE_ID DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	VARCHAR2 (125 BYTE) VARCHAR2 (30 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) FILE INFO
NAME_PREFERRED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF* WORKSPACE_ID DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (15 BYTE)
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NAME PREFERED NAME_REPORTED * RESULT_SCHEMA STATUS F * STUDY_ACCESSION * UPLOAD TICKET_NUMBER U * UOSER_DÉFINED_ID UF * WORKSPACE_ID DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY * PF * ASSESSMENT_PANEL_ACCESSIC PF * FILE_INFO_ID * RESŪLT_SCHEMA DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY FILE_INFO_ID F * DETAIL * PF * DETAIL * PF * DETAIL * NAME * PF * DETAIL * NAME * NATE_CREATED_D NU * NAME * NAME * NAME * NAME * NAME * NAME * NAME * NAME * NAME * NAME * NAME * NAME * NAME * NATE_CREATED_D NU * NAME * NAME * NATE_CREATED_D NU * NAME * NAME * NAME * NATE_CREATED_D NU * NAME * NATE_CREATED_D NU * NAME * NAME * NATE_CREATED_D NU * NATE_CREATED_D NU * NAME * NATE_CREATED_D NU * NATE_CREATED_D NU * NAME * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NATE_CREATED_D NU * NU * NU * NU * NU * NU * NU * NU * NU * NU * NU * NU * NU * NU * NU * NU NU NU NU NU NU NU NU NU NU NU NU NU	VARCHAR2 (125 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (50 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) CHAR2 (250 BYTE) CHAR2 (250 BYTE) CCHAR2 (100 BYTE) CCHAR2 (100 BYTE) CCHAR2 (100 BYTE) CCHAR2 (100 BYTE) CCHAR2 (100 BYTE) CCHAR2 (20 BYTE)

* SUBJECT_ACCESSION ANCESTRAL_POPULATION	DIECT
ANCESTRAL_POPULATION	
	VARCHAR2 (15 BYTE) VARCHAR2 (100 BYTE)
DESCRIPTION	VARCHAR2 (100 BTTE)
ETHNICITY	VARCHAR2 (50 BYTE)
* GENDER	VARCHAR2 (20 BYTE)
RACE	VARCHAR2 (50 BYTE)
RACE_SPECIFY	VARCHAR2 (1000 BYTE)
* SPECIES	VARCHAR2 (50 BYTE)
STRAIN	VARCHAR2 (50 BYTE)
STRAIN_CHARACTERISTICS	VARCHAR2 (500 BYTE)
* UPLOAD_TICKET_NUMBER	VARCHAR2 (100 BYTE)
J * USER_DEFINED_ID	VARCHAR2 (100 BYTE)
JF* WORKSPACE_ID DATE_CREATED	NUMBER (38) DATE
CREATED BY	VARCHAR2 (20 BYTE)
DATE LAST UPDATED	DATE
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
P * PLANNED_VISIT_ACCESSIO	
END RULE	VARCHAR2 (256 BYTE)
MAX START DAY	NUMBER
MIN_START_DAY	NUMBER
NAME	VARCHAR2 (125 BYTE)
* ORDER_NUMBER	NUMBER (38)
F PERIOD_ACCESSION	VARCHAR2 (15 BYTE)
START_RULE F * STUDY_ACCESSION	VARCHAR2 (256 BYTE)
F * STUDY_ACCESSION	VARCHAR2 (15 BYTE)
* UPLOAD_TICKET_NUMBER	
U * USER_DEFINED_ID	VARCHAR2 (100 BYTE)
UF * WORKSPACE_ID	NUMBER (38)
DATE_CREATED	
	VARCHAR2 (20 BYTE)
DATE_LAST_UPDATED LAST_UPDATED_BY	
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S	TUDY
P * STUDY_ACCESSION	VARCHAR2 (15 BYTE)
ACTUAL_COMPLETION_DAT	TE DATE
ACTUAL_ENROLLMENT	NUMBER (38)
ACTUAL_START_DATE	DATE
* AGE_UNII	VARCHAR2 (25 BYTE)
BRIEF_DESCRIPTION	VARCHAR2 (4000 BYTE)
BRIEF TITLE	VARCHAR2 (250 BYTE)
* CLINICAL_TRIAL	VARCHAR2 (1 BYTE)
* CLINICAL_TRIAL CONDITION_STUDIED	VARCHAR2 (1000 BYTE)
* CLINICAL_TRIAL CONDITION_STUDIED * DCL_ID	VARCHAR2 (1000 BYTE) NUMBER (38)
* CLINICAL_TRIAL CONDITION_STUDIED * DCL_ID DELETE_STUDY	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE)
* CLINIČAL TRIAL CONDITION_STUDIED * DCL ID DELETE_STUDY DESCRIPTION	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB
* CLINICAL_TRIAL CONDITION_STUDIED * DCL_ID DELĒTE_STUDY DESCRIPTION DOI	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (250 BYTE)
* CLINIČAL TRIAL CONDITION_STUDIED * DCL ID DELETE_STUDY DESCRIPTION	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (250 BYTE)
* CLINICAL TRIAL CONDITION STUDIED * DCL_ID DELETE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (250 BYTE) VARCHAR2 (250 BYTE) ABLE VARCHAR2 (1 BYTE) CLOB
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* CLINICAL TRIAL CONDITION STUDIED * DCL_ID DELETE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (250 BYTE) ABLE VARCHAR2 (1 BYTE) CLOB DATE DATE
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* CLINICAL TRIAL CONDITION_STUDIED * DCL_ID DELĒTE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_D GENDĒR_INCLUDED HYPOTHĒSIS INITIAL_DATA_RELEASE_VE INITIAL_DATA_RELEASE_VE INTERVENTION_AGENT LATEST_DATA_RELEASE_D	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (250 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB DATE DATE VARCHAR2 (10 BYTE) VARCHAR2 (4000 BYTE) TE TE DATE ERSION VARCHAR2 (10 BYTE) VARCHAR2 (100 BYTE) DATE VARCHAR2 (10 BYTE)
* CLINICAL TRIAL CONDITION_STUDIED * DCL_ID DELĒTE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_DI GENDĒR_INCLŪDED HYPOTHĒSIS INITIAL_DATA_RELEASE_VI INITIAL_DATA_RELEASE_VI INITIAL_DATA_RELEASE_VI LATEST_DATA_RELEASE_V MAXIMUM_AGĒ	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB DATE DATE VARCHAR2 (1 BYTE) CLOB DATE DATE VARCHAR2 (50 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (40 BYTE)
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* CLINICAL TRIAL CONDITION_STUDIED * DCL_ID DELÈTE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_D GENDÈR_INCLUDED HYPOTHESIS INITIAL_DATA_RELEASE_VE INITIAL_DATA_RELEASE_VE INITERVENTION_AGENT LATEST_DATA_RELEASE_V MAXIMUM_AGË MINIMUM_AGË OBJECTIVËS	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (250 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (10 BYTE) VARCHAR2 (400 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) CLOB
* CLINICAL TRIAL CONDITION_STUDIED * DCL_ID DELĒTE_STUDY DESCRIPTION DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_DI GENDĒR INCLŪDED HYPOTHĒSIS INITIAL_DATA_RELEASE_DI INITIAL_DATA_RELEASE_VI INITIAL_DATA_RELEASE_VI INITIAL_DATA_RELEASE_VI INITIAL_DATA_RELEASE_VI LATEST_DATA_RELEASE_VI MAXIMUM_AGĒ MINIMUM_AGĒ OBJECTIVĒS OFFICIAL_TITLĒ	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB DATE DATE VARCHAR2 (50 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) CLOB VARCHAR2 (500 BYTE)
* CLINICAL TRIAL CONDITION_STUDIED * DCL_ID DELÈTE STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_D GENDÈR_INCLUDED HYPOTHÈSIS INITIAL_DATA_RELEASE_VE INITIAL_DATA_RELEASE_VE INITERVENTION_AGENT LATEST_DATA_RELEASE_V MAXIMUM_AGE MINIMUM_AGE OBJECTIVÈS OFFICIAL_TITLE PLANNED_PUBLIC_RELEAS	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB DATE VARCHAR2 (10 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) CLOB VARCHAR2 (40 BYTE) CLOB VARCHAR2 (500 BYTE) SE_DATE
* CLINICAL TRIAL CONDITION_STUDIED * DCL_ID DELÈTE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_D GENDÈR_INCLUDED HYPOTHESIS INITIAL_DATA_RELEASE_VE INITIAL_DATA_RELEASE_VE INITIAL_DATA_RELEASE_VE INITERVENTION_AGENT LATEST_DATA_RELEASE_V MAXIMUM_AGË MINIMUM_AGË OBJECTIVES OFFICIAL_TITLE PLANNED_PUBLIC_RELEASE * SHARED_STUDY	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) CLOB VARCHAR2 (500 BYTE) SE_DATE VARCHAR2 (1 BYTE)
* CLINICĂL TRIAL CONDITION_STUDIED * DCL_ID DELĒTE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_DI GENDĒR_INCLŪDED HYPOTHĒSIS INITIAL_DATA_RELEASE_VI INITIAL_DATA_RELEASE_VI INITIAL_DATA_RELEASE_VI INITIAL_DATA_RELEASE_VI INITIAL_DATA_RELEASE_VI LATEST_DATA_RELEASE_VI MAXIMUM_AGĒ OBJECTIVĒS OFFICIAL_TITLE PLANNED_PUBLIC_RELEAS * SHARED_STUDY SPONSORING_ORGANIZAT	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (500 BYTE) VARCHAR2 (500 BYTE) VARCHAR2 (250 BYTE)
* CLINICĂL TRIAL CONDITION_STUDIED DELĒTE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_D GENDĒR_INCLŪDED HYPOTHĒSIS INITIAL_DATA_RELEASE_DI INITIAL_DATA_RELEASE_VI INITERVENTION_AGENT LATEST_DATA_RELEASE_V MAXIMŪM_AGĒ MINIMUM_AGĒ OBJECTIVĒS OFFICIAL_TITLE PLANNED_PUBLIC_RELEAS \$ SHARED_STUDY SPONSOŘING_ORGANIZAT TARGET_ENROLLMENT	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (250 BYTE) CLOB DATE VARCHAR2 (1 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (400 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) CLOB VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) CLOB VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) NUMBER (38)
* CLINICAL TRIAL CONDITION_STUDIED * DCL_ID DELÈTE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_D GENDÈR_INCLUDED HYPOTHESIS INITIAL_DATA_RELEASE_DY INITIAL_DATA_RELEASE_ST INITIAL_DATA_RELEASE_VT INTERVENTION_AGENT LATEST_DATA_RELEASE_V MAXIMUM_AGË MINIMUM_AGË OBJECTIVËS OFFICIAL_TITLE PLANNED_PUBLIC_RELEAS * SHARED_STUDY SPONSORING_ORGANIZAT TARGET_ENRÔLLMENT TYPE	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) CLOB VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) NUMBER (38) VARCHAR2 (50 BYTE)
CLINICĂL TRIAL CONDITION_STUDIED     DELĒTE_STUDY DELĒTE_STUDY DESCRIPTION DOU DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_D GENDĒR_INCLŪDED HYPOTHĒSIS INITIAL_DATA_RELEASE_D/ INITIAL_DATA_RELEASE_D/ INITIAL_DATA_RELEASE_D/ INITIAL_DATA_RELEASE_VI INTERVĒNTION_AGEN LATEST_DATA_RELEASE_VI MINIMUM_AGĒ OBJECTIVES OFFICIAL_TITLE PLANNED_PUBLIC_RELEAS SHARED_STUDY SPONSORING_ORGANIZAT TARGET_ENRÔLLMENT TYPE UPLOAD_TICKET_NUMBER	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (250 BYTE) ABLE VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (500 BYTE) VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) NUMBER (38) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE)
CLINICĂL TRIAL CONDITION_STUDIED     DCL.ID     DELĒTE STUDY     DESCRIPTION     DOI     DOWNLOAD_PAGE_AVAILA     ENDPOINTS     FINAL_PUBLIC_RELEASE_D     GENDĒR_INCLŪDED     HYPOTHĒSIS     INITIAL_DATA_RELEASE_VI     INITIAL_DATA_RELEASE_VI     INITIAL_DATA_RELEASE_VI     INITIAL_DATA_RELEASE_VI     INITEST_DATA_RELEASE_VI     MAXIMŪM_AGĒ     MINIMUM_AGĒ     OBJECTIVĒS     OFFICIAL_TITLE     PLANNED_PUBLIC_RELEAS     SHARED_ŠTUDY     SPONSORING_ORGANIZAT     TARGET_ENROLLMENT     TYPE     UPLOAD_TICKET_NUMBER     U # UJSEN_DĒFINED_ID	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB DATE VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) CLOB VARCHAR2 (40 BYTE) CLOB VARCHAR2 (10 BYTE) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) VARCHAR2 (1 BYTE) NUMBER (38) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE)
* CLINICAL TRIAL CONDITION_STUDIED * DCL_ID DELÈTE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_D GENDÈR_INCLUDED HYPOTHESIS INITIAL_DATA_RELEASE_VE INITIAL_DATA_RELEASE_VE INITIAL_DATA_RELEASE_VE INITIAL_DATA_RELEASE_VE INITERVENTION_AGENT LATEST_DATA_RELEASE_VE MAXIMUM_AGË MINIMUM_AGË OBJECTIVËS OFFICIAL_TITLE PLANNED_PUBLIC_RELEASE * SHARED_STUDY SPONSORING_ORGANIZAT TARGET_ENRÔLLMENT TYPE * UPLOAD_TICKET_NUMBER U * USER_DÉFINED_ID UF* WORKSPACE_ID	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) NUMBER (38) VARCHAR2 (150 BYTE) VARCHAR2 (150 BYTE) VARCHAR2 (30)
* CLINICĂL TRIAL CONDITION_STUDIED * DCL.ID DELĒTE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_DI GENDĒR_INCLŪDED HYPOTHĒSIS INITIAL_DATA_RELEASE_DI INITIAL_DATA_RELEASE_VI INITEXPENTION_AGEN LATEST_DATA_RELEASE_VI INITEXPENTION_AGEN MINIMUM_AGE OBJECTIVĒS OFFICIAL_TITLE PLANNED_PUBLIC_RELEAS * SHARED_STUDY SPONSORING_ORGANIZAT TARGET_ENRÖLLMENT TYPE * UPLOAD_TICKET_NUMBER U * USER_DĒFINED_ID UF* WORKSPACE_ID DATE_CREATED	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (250 BYTE) CLOB VARCHAR2 (250 BYTE) CLOB VARCHAR2 (250 BYTE) CLOB VARCHAR2 (400 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (40 BYTE) CLOB VARCHAR2 (40 BYTE) CLOB VARCHAR2 (10 BYTE) CLOB VARCHAR2 (100 BYTE) VARCHAR2 (150 BYTE) NUMBER (38) VARCHAR2 (150 BYTE) VARCHAR2 (150 BYTE) VARCHAR2 (150 BYTE) VARCHAR2 (150 BYTE) VARCHAR2 (150 BYTE) VARCHAR2 (150 BYTE) NUMBER (38) VARCHAR2 (150 BYTE) NUMBER (38) VARCHAR2 (150 BYTE) NUMBER (38)
* CLINICAL TRIAL CONDITION_STUDIED * DCL_ID DELETE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_D GENDER_INCLUDED HYPOTHESIS INITIAL_DATA_RELEASE_DL INITIAL_DATA_RELEASE_VE INITERVENTION_AGENT LATEST_DATA_RELEASE_VE MAXIMUM_AGE MINIMUM_AGE OBJECTIVES OFFICIAL_TITLE PLANNED_PUBLIC_RELEAS * SHARED_STUDY SPONSORING_ORGANIZAT TARGET_ENROLLMENT TYPE * UPLOAD_TICKET_NUMBER U * USER_DEFINED_ID UF * WORKSPACE_ID DATE_CREATED_C	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB DATE VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (400 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) VARCHAR2 (40 BYTE) CLOB VARCHAR2 (40 BYTE) VARCHAR2 (10 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (20 BYTE) NUMBER (38) DATE VARCHAR2 (20 BYTE)
* CLINICĂL TRIAL CONDITION_STUDIED * DCL.ID DELĒTE_STUDY DESCRIPTION DOI DOWNLOAD_PAGE_AVAILA ENDPOINTS FINAL_PUBLIC_RELEASE_DI GENDĒR_INCLŪDED HYPOTHĒSIS INITIAL_DATA_RELEASE_DI INITIAL_DATA_RELEASE_VI INITEXPENTION_AGEN LATEST_DATA_RELEASE_VI INITEXPENTION_AGEN MINIMUM_AGE OBJECTIVĒS OFFICIAL_TITLE PLANNED_PUBLIC_RELEAS * SHARED_STUDY SPONSORING_ORGANIZAT TARGET_ENRÖLLMENT TYPE * UPLOAD_TICKET_NUMBER U * USER_DĒFINED_ID UF* WORKSPACE_ID DATE_CREATED	VARCHAR2 (1000 BYTE) NUMBER (38) VARCHAR2 (1 BYTE) CLOB VARCHAR2 (1 BYTE) CLOB VARCHAR2 (250 BYTE) CLOB DATE VARCHAR2 (250 BYTE) VARCHAR2 (400 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (40 BYTE) CLOB VARCHAR2 (40 BYTE) CLOB VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) VARCHAR2 (100 BYTE) VARCHAR2 (100 BYTE) NUMBER (38) DATE

#### 3.3.1.7. Lab Test



#### 3.3.1.8. Experiment



### 3.3.1.9. Assay Results

		MASS SPECTROMETRY RESULT
FCS_ANALYZED_RESULT P * RESULT ID NUMBER (3		P * RESULT ID NUMBER (38)
COMMENTS VARCHAR2	P * STUDY_ACCESSION VARCHAR2 (15 BYTE)	COMMENTS VARCHAR2 (500 BYTE)
F * EXPERIMENT_ACCESSION VARCHAR2	BYTE)	F * EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE)
F * EXPSAMPLE_ACCESSION VARCHAR2	<u>BYTE)</u>	F * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE)
FILE_INFO_ID NUMBER (3		FILE_INFO_ID NUMBER (38)
PARENT_POPULATION_PREFERRED VARCHAR2 PARENT_POPULATION_REPORTED VARCHAR2	BYTE)	* INTENSITY NUMBER RETENTION_TIME NUMBER
POPULATION_DEFNITION_PREFERRED VARCHAR2	(BYTE)	F RETENTION_TIME_UNIT VARCHAR2 (25 BYTE)
POPULATION_DEFNITION_REPORTED VARCHAR2	D BYTE)	M_Z_RATIO NUMBER
POPULATION NAME PREFERRED VARCHAR2	P * ARM_ACCESSION VARCHAR2 (15 BYTE)	Z_CHARGE VARCHAR2 (50 BYTE)
POPULATION_NAME_REPORTED VARCHAR2	BYTE) F * STUDY_ACCESSION VARCHAR2 (15 BYTE)	DATABASE_ID_REPORTED VARCHAR2 (50 BYTE)
POPULATION_STAT_UNIT_PREFERRED VARCHAR2	AYTE)	F DATABASE ID PREFERRED VARCHAR2 (25 BYTE)
POPULATION_STAT_UNIT_REPORTED VARCHAR2 POPULATION_STATISTIC_PREFERRED NUMBER	BTIE)	F * MASS_SPECTROMETRY_TYPE VARCHAR2 (50 BYTE) METABOLITE_NAME_REPORTED VARCHAR2 (255 BYTE)
POPULATION_STATISTIC_REPORTED VARCHAR2	RYTE)	METABOLITE NAME PREFERRED VARCHAR2 (255 BYTE)
* UPLOAD TICKET NUMBER VARCHAR2	BYTE)	PROTEIN_NAME_REPORTED VARCHAR2 (255 BYTE)
F WORKSPACE_FILE_INFO_ID NUMBER (3	ARM 2 SUBJECT	F PROTEIN_NAME_PREFERRED VARCHAR2 (255 BYTE)
DATE_CREATED DATE	PF * ARM_ACCESSION VARCHAR2 (15 BYTE)	* UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) DATE_CREATED DATE
CREATED_BY VARCHAR2 DATE LAST UPDATED DATE	PF * SUBJECT_ACCESSION VARCHAR2 (15 BYTE)	CREATED_BY VARCHAR2 (20 BYTE)
LAST_UPDATED_BY VARCHAR2	RYTE)	DATE LAST UPDATED DATE
		DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE)
*		* *
HAI RESULT		MBAA_RESULT
P * RESULT ID NUMBER (38)	SUBJECT	P * RESULT_ID NUMBER (38)
COMMENTS VARCHAR2 (500 BYTE	P * SUBJECT_ACCESSION VARCHAR2 (15 BYTE)	F * EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE)
F * EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE)		ANALYTE_PREFERRED VARCHAR2 (15 BYTE)
F * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE)		ANALYTE_REPORTED VARCHAR2 (100 BYTE) ASSAY_GROUP_ID VARCHAR2 (100 BYTE)
FILE_INFO_ID NUMBER (38)		ASSAY ID VARCHAR2 (100 BYTE)
UNIT_PREFERRED VARCHAR2 (50 BYTE)		COMMENTS VARCHAR2 (500 BYTE)
UNIT_REPORTED VARCHAR2 (200 BYTE * UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE		CONCENTRATION_UNIT_REPORTED VARCHAR2 (100 BYTE)
VALUE PREFERRED NUMBER	BIOSAMPLE	CONCENTRATION_VALUE_REPORTED VARCHAR2 (100 BYTE)
VALUE_REPORTED VARCHAR2 (50 BYTE)	P * BIOSAMPLE_ACCESSION VARCHAR2 (15 BYTE)	FILE_INFO_ID NUMBER (38) MFI VARCHAR2 (100 BYTE)
VIRUS_STRAIN_PREFERRED VARCHAR2 (200 BYTE	F PLANNED_VĪSIT_ACCESSION VARCHAR2 (15 BYTE) F STUDY AČCESSĪON VARCHAR2 (15 BYTE)	MFI VARCHAR2 (100 BYTE) MFI_COORDINATE VARCHAR2 (100 BYTE)
VIRUS_STRAIN_REPORTED VARCHAR2 (200 BYTE	F STUDY_ACCESSION VARCHAR2 (15 BYTE) F * SUBJECT_ACCESSION VARCHAR2 (15 BYTE)	* SOURCE_ACCESSION VARCHAR2 (100 BTTE)
DATE_CREATED DATE	VARCHARZ (13 BTE)	* SOURCE_ACCESSION VARCHAR2 (15 BYTE) * SOURCE_TYPE VARCHAR2 (30 BYTE)
CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE		* UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE)
LAST_UPDATED_BY VARCHAR2 (20 BYTE)		DATE_CREATED DATE
		CREATED BY VARCHAR2 (20 BYTE)
		DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE)
PCR_RESULT		CONCENTRATION_UNIT_PREFERRED VARCHAR2 (50 BYTE)
P * RESULT_ID NUMBER (38)	EXPSAMPLE_2_BIOSAMPLE	CONCENTRATION_VALUE_PREFERRED_NUMBER
COMMENTS VARCHAR2 (500 BY	PF * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE)	
F * EXPERIMENT_ACCESSION VARCHAR2 (15 BYT)	PF * BIOSAMPLE_ACCESSION VARCHAR2 (15 BYTE)	¥.
F * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYT FILE_INFO_ID NUMBER (38)		/
GENE_ID VARCHAR2 (10 BYT		ELISPOT_RESULT
GENE_NAME VARCHAR2 (4000 B		P * RESULT_ID NUMBER (38)
GENE SYMBOL REPORTED VARCHAR2 (100 BY		ANALYTE_PREFERRED VARCHAR2 (15 BYTE)
OTHER_GENE_ACCESSION VARCHAR2 (250 BY	EXPSAMPLE	* ANALYTE_REPORTED VARCHAR2 (100 BYTE)
UNIT_PREFERRED VARCHAR2 (200 BY	P * EXPSAMPLE ACCESSION VARCHAR2 (15 BYTE)	CELL_NUMBER_PREFERRED_NUMBER CELL_NUMBER_REPORTED_VARCHAR2 (50 BYTE)
UNIT_REPORTED VARCHAR2 (200 BY	F * EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE)	CELL_NUMBER_REPORTED VARCHAR2 (50 BYTE) COMMENTS VARCHAR2 (500 BYTE)
* UPLOAD_TICKET_NUMBER VARCHAR2 (100 BY VALUE_PREFERRED NUMBER		F * EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE)
VALUE_REPORTED VARCHAR2 (50 BYT		F * EXPSAMPLE ACCESSION VARCHAR2 (15 BYTE)
DATE_CREATED DATE		FILE_INFO_ID NUMBER (38)
CREATED_BY VARCHAR2 (20 BYT)		SPOT_NUMBER_PREFERRED_NUMBER
DATE_LAST_UPDATED DATE		SPOT_NUMBER_REPORTED_VARCHAR2 (50 BYTE) * UPLOAD_TICKET_NUMBER_VARCHAR2 (100 BYTE)
LAST_UPDATED_BY VARCHAR2 (20 BYT		DATE_CREATED DATE
GENE_SYMBOL_PREFERRED VARCHAR2 (15 BYT		CREATED BY VARCHAR2 (20 BYTE)
		DATE_LAST_UPDATED DATE
ELISA RESULT	EXPERIMENT	LAST_UPDATED_BY VARCHAR2 (20 BYTE)
P * RESULT_ID NUMBER (38)	P * EXPERIMENT ACCESSION VARCHAR2 (15 BYTE)	
ANALYTE_PREFERRED VARCHAR2 (15 BYTE)	F * STUDY_ACCESSION VARCHAR2 (15 BYTE)	HLA TYPING RESULT
* ANALYTE_REPORTED VARCHAR2 (100 BYTE		P * RESULT_ID NUMBER (38)
COMMENTS VARCHAR2 (500 BYTE		ALLELE_1 VARCHAR2 (250 BYTE)
F * EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE)		
E & EVOCAMOLE ACCECCION MADOULOS (SE SUCC		ALLELE 2 VARCHAR2 (250 BYTE)
F * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE)		ALLELE_2 VARCHAR2 (250 BYTE) ANCESTRAL POPULATION VARCHAR2 (250 BYTE)
F * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE) FILE INFO ID NUMBER (38)		ALLELE 2 VARCHAR2 (250 BYTE) ANCESTRAL_POPULATION VARCHAR2 (550 BYTE) COMMENTS VARCHAR2 (500 BYTE)
F * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE) FILE INFO ID NUMBER (38)		ALLELE 2         VARCHAR2 (250 BYTE)           ANCESTRAL_POPULATION         VARCHAR2 (250 BYTE)           COMMENTS         VARCHAR2 (500 BYTE)           F * EXPERIMENT_ACCESSION         VARCHAR2 (15 BYTE)
F * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE) FILE INFO ID NUMBER (38) UNIT_PREFERRED VARCHAR2 (50 BYTE) UNIT_REPORTED VARCHAR2 (200 BYT * UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE		ALLELE_2 VARCHAR2 (250 BYTE) ANCESTRAL_POPULATION VARCHAR2 (250 BYTE) COMMENTS VARCHAR2 (250 BYTE) F EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE) F EXPERIMEL_ACCESSION VARCHAR2 (15 BYTE)
F * EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE) FILE_INFO_ID NUMBER (38) UNIT_PREFERRED VARCHAR2 (50 BYTE) UNIT_REPORTED VARCHAR2 (100 BYTE VPLOAD_TICKET_NUMBER_VARCHAR2 (100 BYTE VALUE PREFERRED NUMBER		ALLELE 2 VARCHAR2 (250 BYTE) ANCESTRAL POPULATION VARCHAR2 (250 BYTE) COMMENTS VARCHAR2 (250 BYTE) F EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE) F EXPSAMPLE_ACCESSION VARCHAR2 (15 BYTE) FILE_INFO_ID LOCUS NAME VARCHAR2 (25 BYTE)
F * EXPSAMPLE ACCESSION VARCHAR2 (15 BYTE) FILE_INFO.ID NUMBER (38) UNIT_PREFERRED VARCHAR2 (30 BYTE) UNIT_REPORTED VARCHAR2 (30 BYTE) * UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) VALUE_PREFERRED VARCHAR2 (100 BYTE) VALUE_REPORTED VARCHAR2 (50 BYTE)		ALLELE_Z VARCHAR2 (250 BYTE) ANCESTRAL_POPULATION VARCHAR2 (250 BYTE) COMMENTS VARCHAR2 (250 BYTE) F EXPREMIENT_ACCESSION VARCHAR2 (15 BYTE) F EXPREMIENT_ACCESSION VARCHAR2 (15 BYTE) FILE_INFO_ID NUMBER (38) LOCUS_NAME VARCHAR2 (25 BYTE) RESULT_SET_ID NUMBER (38)
F * EXPSAMPLE ACCESSION VARCHAR2 (15 BYTE) FILE_INFO_ID NUMBER (38) UNIT_PREFERRED VARCHAR2 (50 BYTE) UNIT_REPORTED VARCHAR2 (200 BYTE) VALUE_REPORTED NUMBER VALUE_REFERRED NUMBER VALUE_REFERRED NUMBER VALUE_REPORTED DATE		ALLELE Z VARCHAR2 (250 BYTE) ANCESTRAL POPULATION VARCHAR2 (250 BYTE) COMMENTS VARCHAR2 (250 BYTE) F EXPREMIENT ACCESSION VARCHAR2 (150 BYTE) F EXPREMIENT ACCESSION VARCHAR2 (15 BYTE) FILE INFO_ID NUMBER (38) LOCUS NAME VARCHAR2 (25 BYTE) RESULT_ST_ID NUMBER (38) UMBER (38) F UPLOAD TICKET NUMBER VARCHAR2 (100 BYTE)
F * EXPSAMPLE ACCESSION VARCHAR2 (15 BYTE) FILE_INFO.ID NUMBER (38) UNIT_PREFERRED VARCHAR2 (30 BYTE) UNIT_REPORTED VARCHAR2 (30 BYTE) * UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) VALUE_PREFERRED VARCHAR2 (100 BYTE) VALUE_REPORTED VARCHAR2 (50 BYTE) DATE_CREATED DY VARCHAR2 (20 BYTE)		ALLELE_Z VARCHAR2 (250 BYTE) ANCESTRAL_POPULATION VARCHAR2 (250 BYTE) COMMENTS VARCHAR2 (250 BYTE) F EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE) F EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE) FILE_INFO_ID NUMBER (38) LOCUS_NAME VARCHAR2 (32 BYTE) RESULT_SET_ID NUMBER (38) UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) DATE_CEATED DATE
F • EXPSAMPLE ACCESSION VARCHAR2 (15 BYTE) FILE.INFO.ID NUMBER (38) UNIT_PREFERRED VARCHAR2 (200 BYTE) UNIT_REPORTED VARCHAR2 (200 BYTE) VALUE_REPORTED NUMBER VALUE_REFERRED NUMBER VALUE_REFORTED NARCHAR2 (20 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE		ALLELE_Z VARCHAR2 (250 BYTE) ANCESTRAL_POPULATION VARCHAR2 (250 BYTE) COMMENTS VARCHAR2 (250 BYTE) F EXPERIMENT_ACCESSION VARCHAR2 (150 BYTE) F EXPERIMENT_ACCESSION VARCHAR2 (151 BYTE) F LE_INFO_ID VARCHAR2 (151 BYTE) LOCUS_NAME VARCHAR2 (25 BYTE) UDICUS_NAME VARCHAR2 (20 BYTE) DATE_CREATED DATE CREATED BY VARCHAR2 (20 BYTE)
F * EXPSAMPLE ACCESSION VARCHAR2 (15 BYTE) FILE_INFO.ID NUMBER (38) UNIT_PREFERRED VARCHAR2 (30 BYTE) UNIT_REPORTED VARCHAR2 (30 BYTE) * UPLOAD_TICKET_NUMBER VARCHAR2 (100 BYTE) VALUE_PREFERRED VARCHAR2 (100 BYTE) VALUE_REPORTED VARCHAR2 (50 BYTE) DATE_CREATED DY VARCHAR2 (20 BYTE)		ALLELE_Z VARCHAR2 (250 BYTE) ANCESTRAL_POPULATION VARCHAR2 (250 BYTE) COMMENTS VARCHAR2 (250 BYTE) F EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE) F EXPERIMENT_ACCESSION VARCHAR2 (15 BYTE) FILE_INFO_ID NUMBER (38) LOCUS_NAME VARCHAR2 (32 BYTE) RESULT_SET_ID NUMBER VARCHAR2 (20 BYTE) DATE_CREATED_DY VARCHAR2 (20 BYTE) DATE_CREATED_DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_CAST UPDATED_DATE
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#### 3.3.1.10. Lookup Tables - Part 1

There are approximately 65 tables in the IMMPORT\_CORE schema, that ImmPort calls lookup tables, but other groups may refer to as controlled vocabulary tables. These tables are used to help harmonize the data from study to study. For many of the base tables ImmPort has both a reported\_name and preferred\_name and the preferred name is mapped to one of the lookup tables. In addition, several lookup tables are populated using terms from ontologies.

LK ADVERSE EVENT SEVERITY	LK CELL POP EXPRESSION VALUE	LK CELL POP SUFFIX
P * NAME VARCHAR2 (60 BYTE)	P * NAME VARCHAR2 (150 BYTE)	P * NAME VARCHAR2 (150 BYTE)
DESCRIPTION VARCHAR2 (1000 BYTE)	U * VALUE VARCHAR2 (150 BYTE)	
LINK VARCHAR2 (2000 BYTE)	U * SORT ORDER NUMBER (38)	
	* REGULAR_EXPRESSION VARCHAR2 (500 BYTE)	* REGULAR_EXPRESSION VARCHAR2 (500 BYTE)
CREATED_BY VARCHAR2 (20 BYTE)	REPLACEMENT VARCHAR2 (150 BYTE)	* DESCRIPTION VARCHAR2 (1000 BYTE)
DATE_LAST_UPDATED DATE	* AS_SEPARATOR NUMBER (38)	LINK VARCHAR2 (2000 BYTE)
LAST_UPDATED_BY VARCHAR2 (20 BYTE)	* AS_STOPPING NUMBER (38)	DATE CREATED DATE
	* DESCRIPTION VARCHAR2 (1000 BYTE)	CREATED BY VARCHAR2 (20 BYTE)
	LINK VARCHAR2 (2000 BYTE)	DATE_LAST_UPDATED DATE
LK ANALYTE	DATE_CREATED DATE	LAST UPDATED BY VARCHAR2 (20 BYTE)
	CREATED_BY VARCHAR2 (20 BYTE)	LAST_OFDATED_BT VARCHARZ (20 BTTE)
P * ANALYTE_ACCESSION VARCHAR2 (15 BYTE)		
GENE SYMBOL VARCHAR2 (100 BYTE)		LK CELL POP SEPARATOR
GENE ALIASES VARCHAR2 (4000 BYTE)	LAST_UPDATED_BY VARCHAR2 (20 BYTE)	P * NAME VARCHAR2 (150 BYTE)
GENE ID VARCHAR2 (10 BYTE)	* PREFERRED_VALUE VARCHAR2 (150 BYTE)	U * VALUE VARCHAR2 (150 BYTE)
GENETIC_NOMENCLATURE_ID VARCHAR2 (100 BYTE)		ARCHARZ (150 DTTE)
	LK CELL POP IGNORE	* REGULAR_EXPRESSION VARCHAR2 (500 BYTE)
		* IS_PRIMARY_VALUE VARCHAR2 (1 BYTE)
LINK VARCHAR2 (2000 BYTE)	P * NAME VARCHAR2 (150 BYTE)	PREFERRED_VALUE VARCHAR2 (150 BYTE)
OFFICIAL_GENE_NAME VARCHAR2 (255 BYTE)	U * VALUE VARCHAR2 (150 BYTE)	IGNORE STRING VARCHAR2 (150 BYTE)
PROTEIN_ONTOLOGY_ID VARCHAR2 (15 BYTE)	U * SORT ORDER NUMBER (38)	* DESCRIPTION VARCHAR2 (1000 BYTE)
PROTEIN ONTOLOGY NAME VARCHAR2 (100 BYTE)	* REGULAR EXPRESSION VARCHAR2 (500 BYTE)	LINK VARCHAR2 (2000 BYTE)
PROTEIN ONTOLOGY SYNONYMS VARCHAR2 (4000 BYTE)	* DESCRIPTION VARCHAR2 (1000 BYTE)	DATE CREATED DATE
TAXONOMY ID VARCHAR2 (10 BYTE)	LINK VARCHAR2 (2000 BYTE)	
		CREATED_BY VARCHAR2 (20 BYTE)
UNIPROT_ENTRY VARCHAR2 (20 BYTE)	DATE_CREATED DATE	DATE_LAST_UPDATED DATE
UNIPROT_ENTRY_NAME VARCHAR2 (255 BYTE)	CREATED_BY VARCHAR2 (20 BYTE)	LAST_UPDATED_BY VARCHAR2 (20 BYTE)
DATE_CREATED DATE	DATE_LAST_UPDATED DATE	
CREATED_BY VARCHAR2 (20 BYTE)	LAST_UPDATED_BY VARCHAR2 (20 BYTE)	LK CELL POP PREFIX
DATE LAST UPDATED DATE		
LAST UPDATED BY VARCHAR2 (20 BYTE)		P * NAME VARCHAR2 (150 BYTE)
PROTEIN ONTOLOGY SHORT LABEL VARCHAR2 (255 BYTE)	LK CELL POP PATTERN	U * VALUE VARCHAR2 (150 BYTE)
		U * SORT_ORDER NUMBER (38)
	P * NAME VARCHAR2 (150 BYTE)	* REGULAR_EXPRESSION VARCHAR2 (500 BYTE)
+	U * VALUE VARCHAR2 (150 BYTE)	* DESCRIPTION VARCHAR2 (1000 BYTE)
	* REGULAR_EXPRESSION VARCHAR2 (500 BYTE)	LINK VARCHAR2 (2000 BYTE)
LK ANALYTE PREF MAPPING	ANCILLARY INFO VARCHAR2 (1000 BYTE)	DATE CREATED DATE
PF * ANALYTE ACCESSION VARCHAR2 (15 BYTE)	* DESCRIPTION VARCHAR2 (1000 BYTE)	CREATED BY VARCHAR2 (20 BYTE)
	LINK VARCHAR2 (2000 BYTE)	
TAXONOMY ID VARCHAR2 (10 BYTE) P * ANALYTE PREFERRED VARCHAR2 (100 BYTE)	DATE CREATED DATE	DATE_LAST_UPDATED DATE
	CREATED DATE	LAST_UPDATED_BY VARCHAR2 (20 BYTE)
P * ANALYTE_REPORTED VARCHAR2 (100 BYTE)	CREATED_BY VARCHAR2 (20 BYTE)	
GENE_NAME VARCHAR2 (255 BYTE)	DATE_LAST_UPDATED DATE	
GENETIC_NOMENCLATURE_ID_VARCHAR2 (100 BYTE)	LAST UPDATED BY VARCHAR2 (20 BYTE)	LK COMPOUND ROLE
MAPPING SOURCE INFO VARCHAR2 (50 BYTE)		
MAPPING SOURCE INFO VARCHAR2 (50 BYTE)		P * NAME VARCHAR2 (40 BYTE)
MAPPING_SOURCE_INFO VARCHAR2 (50 BYTE) MAPPING_UPDATE_FLAG VARCHAR2 (1 BYTE)	LK CELL POP PREF MAPPING	P * NAME VARCHAR2 (40 BYTE) DESCRIPTION VARCHAR2 (1000 BYTE)
MAPPING_SOURCE_INFO VARCHAR2 (50 BYTE) MAPPING_UPDATE_FLAG VARCHAR2 (1 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (75 BYTE)		P * NAME VARCHAR2 (40 BYTE) DESCRIPTION VARCHAR2 (1000 BYTE) LINK VARCHAR2 (2000 BYTE)
MAPPING_SOURCE_INFO VARCHAR2 (50 BYTE) MAPPING_UPDATE_FLAG VARCHAR2 (1 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (75 BYTE) COMMENTS VARCHAR2 (200 BYTE)	PF * MARKER PREFERRED VARCHAR2 (150 BYTE)	P * NAME VARCHAR2 (40 BYTE) DESCRIPTION VARCHAR2 (1000 BYTE) LINK VARCHAR2 (2000 BYTE) DATE CREATED DATE
MAPPING_SOURCE_INFO VARCHAR2 (50 BYTE) MAPPING_UPDATE_FLAG VARCHAR2 (1 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (75 BYTE) COMMENTS VARCHAR2 (200 BYTE) SORT_ORDER NUMBER	PF * MARKER_PREFERRED VARCHAR2 (150 BYTE) P * MARKER_REPORTED VARCHAR2 (150 BYTE)	P * NAME VARCHAR2 (40 BYTE) DESCRIPTION VARCHAR2 (1000 BYTE) LINK VARCHAR2 (2000 BYTE) DATE CREATED DATE
MAPPING SOURCE_INFO VARCHAR2 (50 BYTE) MAPPING_UPDATE_FLAG VARCHAR2 (1 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (75 BYTE) COMMENTS VARCHAR2 (200 BYTE) SORT_ORDER NUMBER DATE_CREATED DATE	PF * MARKER_PREFERRED VARCHAR2 (150 BYTE) P * MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO VARCHAR2 (50 BYTE)	P * NAME         VARCHAR2 (40 BYTE)           DESCRIPTION         VARCHAR2 (1000 BYTE)           LINK         VARCHAR2 (2000 BYTE)           DATE_CREATED         DATE
MAPPING_SOURCE_INFO VARCHAR2 (50 BYTE) MAPPING_UPDATE_FLAG VARCHAR2 (1 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (75 BYTE) COMMENTS VARCHAR2 (200 BYTE) SORT_ORDER NUMBER	PF * MARKER_PREFERRED VARCHAR2 (150 BYTE) P * MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO VARCHAR2 (50 BYTE) MAPPING_UPDATE_FLAG VARCHAR2 (1 BYTE)	P * NAME     VARCHAR2 (40 BYTE)       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE     CREATED       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE
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MAPPING SOURCE INFO     VARCHAR2 (50 BYTE)       MAPPING UPDATE FLAG     VARCHAR2 (1 BYTE)       MAPPING UPDATE USAGE     VARCHAR2 (200 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE LAST_UPDATED     DATE	PF + MARKER_PREFERRED VARCHAR2 (150 BYTE) P + MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_FLAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (15 BYTE) COMMENTS VARCHAR2 (250 BYTE)	P * NAME     VARCHAR2 (40 BYTE)       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE     CREATED       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE
MAPPING SOURCE INFO VARCHAR2 (50 BYTE) MAPPING_UPDATE_FLAG VARCHAR2 (1 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (75 BYTE) COMMENTS VARCHAR2 (200 BYTE) SORT_ORDER NUMBER DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE)	PF * MARKER_PREFERRED         VARCHAR2 (150 BYTE)           P * MARKER_REPORTED         VARCHAR2 (150 BYTE)           MAPPING_SOURCE_INFO         VARCHAR2 (150 BYTE)           MAPPING_UPDATE_FLAG         VARCHAR2 (150 BYTE)           MAPPING_UPDATE_USAGE         VARCHAR2 (150 BYTE)           COMMENTS         VARCHAR2 (75 BYTE)           SORT_ORDER         NUMBER (38)	P * NAME     VARCHAR2 (40 BYTE)       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)
MAPPING SOURCE INFO     VARCHAR2 (50 BYTE)       MAPPING UPDATE_IEAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (75 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE	PF * MARKER_REFERRED     VARCHAR2 (150 BYTE)       P * MARKER_REPORTED     VARCHAR2 (150 BYTE)       MAPPING_SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_FLAG     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (17 BYTE)       SORT_ORDER     VARCHAR2 (250 BYTE)       SORT_CRDER     NUMBER (38)       DATE     CREARE	P * NAME     VARCHAR2 (40 BYTE)       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)
MAPPING, SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_FLAG     VARCHAR2 (15 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)	PF * MARKER_REFERRED     VARCHAR2 (150 BYTE)       P * MARKER_REPORTED     VARCHAR2 (150 BYTE)       MAPPING_SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_FLAG     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (17 BYTE)       SORT_ORDER     VARCHAR2 (250 BYTE)       SORT_CRDER     NUMBER (38)       DATE     CREARE	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE     CREATED       CREATED     DATE       CREATED     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)
MAPPING SOURCE INFO     VARCHAR2 (50 BYTE)       MAPPING UPDATE FLAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (75 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE	PF * MARKER_PREFERRED         VARCHAR2 (150 BYTE)           P * MARKER_REPORTED         VARCHAR2 (150 BYTE)           MAPPING_SOURCE_INFO         VARCHAR2 (150 BYTE)           MAPPING_UPDATE_FLAG         VARCHAR2 (150 BYTE)           MAPPING_UPDATE_USAGE         VARCHAR2 (150 BYTE)           MAPPING_UPDATE_USAGE         VARCHAR2 (250 BYTE)           SORT_ORDER         NUMBER (250 BYTE)           DATE_CREATED         DATE           CREATED_BY         VARCHAR2 (20 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE     CREATED DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)
MAPPING SOURCE INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)	PF * MARKER_PREFERRED     VARCHAR2 (150 BYTE)       P * MARKER_REPORTED     VARCHAR2 (150 BYTE)       MAPPING_SOURCE_INFO     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_FLAG     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (150 BYTE)       COMMENTS     VARCHAR2 (150 BYTE)       SORT_ORDER     NUMBER (250 BYTE)       DATE_CREATED     DATE       CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE     CREATED       CREATED     DATE       CREATED     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)
MAPPING     SOURCE_INFO     VARCHAR2 (16 DTE)       MAPPING_UPDATE_FLAG     VARCHAR2 (175 DTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (100 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)	PF * MARKER_PREFERRED         VARCHAR2 (150 BYTE)           P * MARKER_REPORTED         VARCHAR2 (150 BYTE)           MAPPING_SOURCE_INFO         VARCHAR2 (150 BYTE)           MAPPING_UPDATE_FLAG         VARCHAR2 (150 BYTE)           MAPPING_UPDATE_USAGE         VARCHAR2 (150 BYTE)           MAPPING_UPDATE_USAGE         VARCHAR2 (250 BYTE)           SORT_ORDER         NUMBER (250 BYTE)           DATE_CREATED         DATE           CREATED_BY         VARCHAR2 (20 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE     CREATED DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)
MAPPING SOURCE_INFO     VARCHAR2 (15 0 SYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (15 BYTE)       VARCHAR2 (15 BYTE)     VARCHAR2 (12 00 BYTE)       SORT_ORDER     VARCHAR2 (200 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     AGE       P * NAME     VARCHAR2 (40 BYTE)       * DESCRIPTION     VARCHAR2 (400 BYTE)	PF * MARKER_PREFERRED     VARCHAR2 (150 BYTE)       P * MARKER_REPORTED     VARCHAR2 (150 BYTE)       MAPPING_SOURCE_INFO     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_FLAG     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (150 BYTE)       COMMENTS     VARCHAR2 (150 BYTE)       SORT_ORDER     NUMBER (250 BYTE)       DATE_CREATED     DATE       CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE	P * NAME     VARCHAR2 (40 BYTE)       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     LAST_UPDATED_BY       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK_CONCENTRATION_ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * PATTERN     VARCHAR2 (50 BYTE)       ADD_SUBTRACT     VARCHAR2 (50 BYTE)
MAPPING, SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)	PF * MARKER_PREFERRED VARCHAR2 (150 BYTE) P * MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (15 BYTE) COMMENTS VARCHAR2 (250 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LK     CONCENTRATION       P * NAME     VARCHAR2 (50 BYTE)       DIGITS_TO     VARCHAR2 (50 BYTE)       * PATTERN     VARCHAR2 (50 BYTE)       ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)
MAPPING, SOURCE_INFO     VARCHAR2 (15 0 BYTE)       MAPPING_UPDATE_FLAG     VARCHAR2 (175 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (100 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       VARCHAR2 (20 BYTE)     DATE       P * NAME     VARCHAR2 (40 BYTE)       * DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (2000 BYTE)	PF * MARKER_PREFERRED P * MARKER_REPORTED MAPPING_SOURCE_INFO MAPPING_UPDATE_FLAG MAPPING_UPDATE_FLAG MAPPING_UPDATE_USAGE COMMENTS SORT_ORDER DATE_CREATED DATE_CREATED DATE_CREATED DATE_CREATED DATE_LAST_UPDATED VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       DIGITS_TO     VARCHAR2 (50 BYTE)       ADD_SUBTRACT     VARCHAR2 (50 BYTE)       ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)
MAPPING, SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK AGE EVENT       P     NAME       VARCHAR2 (40 BYTE)     VARCHAR2 (200 BYTE)       LINK     VARCHAR2 (200 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE_CREATED_DATE     DATE       CREATED_BY     VARCHAR2 (200 BYTE)	PF * MARKER_PREFERRED     VARCHAR2 (150 BYTE)       P * MARKER_REPORTED     VARCHAR2 (150 BYTE)       MAPPING_SOURCE_INFO     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (150 BYTE)       SORT_ORDER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CELL_POPULATION_MARKER       P * NAME     VARCHAR2 (150 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * ADTERN     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       * VALUE     NUMBER (38)       * VALUE     DATE_CREATED
MAPPING, SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       VARCHAR2 (20 BYTE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LINK     VARCHAR2 (40 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (200 BYTE)	PF * MARKER_PREFERRED     VARCHAR2 (150 BYTE)       P * MARKER_REPORTED     VARCHAR2 (150 BYTE)       MAPPING_SOURCE_INFO     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_LAG     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (150 BYTE)       SORT_ORDER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CELL     POPULATION       P * NAME     VARCHAR2 (100 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       UNK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (200 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK_CONCENTRATION ROUNDING     P       P * NAME     VARCHAR2 (50 BYTE)       DIGITS_TO     VARCHAR2 (50 BYTE)       ADD_SUBTRACT     VARCHAR2 (50 BYTE)       ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       VALUE     NUMBER (38)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)
MAPPING, SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK AGE EVENT       P     NAME       VARCHAR2 (40 BYTE)     VARCHAR2 (200 BYTE)       LINK     VARCHAR2 (200 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE_CREATED_DATE     DATE       CREATED_BY     VARCHAR2 (200 BYTE)	PF * MARKER_PREFERRED VARCHAR2 (150 BYTE) P * MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_FLAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (250 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATEDBY VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) * DESCRIPTION VARCHAR2 (200 BYTE) LINK VARCHAR2 (200 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       EXECONCENTRATION ROUNDING     P       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * PATTERN     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       DATE_CREATED     DATE       * VALUE     NUMBER (38)       DATE_CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED_DATE     DATE
MAPPING, SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       VARCHAR2 (20 BYTE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LINK     VARCHAR2 (40 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (200 BYTE)	PF * MARKER_PREFERRED VARCHAR2 (150 BYTE) P * MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_FLAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) VARCHAR2 (150 BYTE) VARCHAR2 (150 BYTE) VARCHAR2 (150 BYTE) * <b>LK CELL POPULATION MARKER</b> P * NAME VARCHAR2 (1000 BYTE) LINK VARCHAR2 (1000 BYTE) LINK VARCHAR2 (2000 BYTE) DATE_CREATED DATE	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       DATE     C2000 BYTE)       DATE     C2000 BYTE)       DATE     CARCHAR2 (200 BYTE)       DATE     LAST_UPDATED       DATE     LAST_UPDATED_BY       VARCHAR2 (20 BYTE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       VALUE     NUMBER (38)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)
MAPPING SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_ISAG     VARCHAR2 (18 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       VARCHAR2 (20 BYTE)     DATE       LINK     VARCHAR2 (20 BYTE)       LINK     VARCHAR2 (200 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (200 BYTE)	PF * MARKER_PREFERRED VARCHAR2 (150 BYTE) P * MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_FLAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (250 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATEDBY VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) * DESCRIPTION VARCHAR2 (200 BYTE) LINK VARCHAR2 (200 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       EXECONCENTRATION ROUNDING     P       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * PATTERN     VARCHAR2 (50 BYTE)       * OD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       ADTE_CREATED     DATE       VALUE     NUMBER (38)       DATE_CREATED_DATE     DATE       VARCHAR2 (20 BYTE)     DATE
MAPPING, SOURCE, INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_FLAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       P     * NAME     VARCHAR2 (40 BYTE)       * DESCRIPTION     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)	PF + MARKER_PREFERRED VARCHAR2 (150 BYTE) P + MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) <b>LK_CELL_POPULATION_MARKER</b> P * NAME VARCHAR2 (200 BYTE) LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE COMMENTS VARCHAR2 (200 BYTE) LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED_CATE	P * NAME     VARCHAR2 (40 BYTE)       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       DIGITS_TO     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * PATTERN     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       * VALUE     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)
MAPPING, SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       P * NAME     VARCHAR2 (40 BYTE)       * DESCRIPTION     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CRATED_BY     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       LINK     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LAST_UPDATED_DATE     DATE       LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)	PF * MARKER_PREFERRED VARCHAR2 (150 BYTE) P * MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_BY VARCHAR2 (20 BYTE) LAST_UPDATED_BY VARCHAR2 (20 BYTE) * COMMENTS VARCHAR2 (150 BYTE) * CREATED_DATE LAST_UPDATED_DATE LAST_UPDATED_DATE VARCHAR2 (150 BYTE) * CREATED_BY VARCHAR2 (1000 BYTE) LINK VARCHAR2 (200 BYTE) DATE_CREATED_DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_LAST_UPDATED_DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_LAST_UPDATED_DATE	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       DATE     C2000 BYTE)       DATE     CREATED       DATE     CREATED       DATE     VARCHAR2 (200 BYTE)       DATE     DATE       CREATED     DATE       DATE     LAST_UPDATED       DATE     VARCHAR2 (20 BYTE)       DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       IGITS_TO     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       DATE     CREATED       OATE     CREATED       OATE     CREATED       VARCHAR2 (20 BYTE)     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LK     CONCENTRATION TO PG ML
MAPPING SOURCE INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (1 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     AGE       EVENT     VARCHAR2 (20 BYTE)       LIK     VARCHAR2 (40 BYTE)       * DESCRIPTION     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED_DATE     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED_DATE     DATE       LINK     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_DATE     DATE       LAST_UPD	PF + MARKER_PREFERRED VARCHAR2 (150 BYTE) P + MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) <b>LK_CELL_POPULATION_MARKER</b> P * NAME VARCHAR2 (200 BYTE) LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE COMMENTS VARCHAR2 (200 BYTE) LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED_DATE	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       DATE     CREATED       DATE     CREATED       DATE     CREATED       DATE     CREATED       DATE     LINK       VARCHAR2 (200 BYTE)       DATE     LAST_UPDATED       DATE     LAST_UPDATED_BY       VARCHAR2 (20 BYTE)       DATE       LAST_UPDATED_BY       VARCHAR2 (50 BYTE)       * DIGITS TO       * PATTERN       * VARCHAR2 (50 BYTE)       * OBGUEN       * GROUP, NUMBER       NUMBER (38)       DATE       DATE       CREATED       BATE       * VALUE       NUMBER (38)       DATE       DATE       CREATED       DATE       CREATED       BATE       CREATED       DATE       CREATED       DATE       CARCHAR2 (20 BYTE)       DATE       LK       CONCENTRATION       VARCHAR2 (20 BYTE)       LK       CONCENTRATION       VARCHAR2 (20 BYTE)
MAPPING, SOURCE_INFO     VARCHAR2 (16 DTTE)       MAPPING_UPDATE_FLAG     VARCHAR2 (175 DTTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (100 BYTE)       COMMENTS     VARCHAR2 (100 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       P * NAME     VARCHAR2 (40 BYTE)       * DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (200 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (200 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     ANCESTRAL_POPULATION       P * NAME     VARCHAR2 (30 BYTE)	PF + MARKER_PREFERRED VARCHAR2 (150 BYTE) P + MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) COMMENTS VARCHAR2 (20 BYTE) VARCHAR2 (200 BYTE) COMMENTS VARCHAR2 (200 BYTE) COMMENTS VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_CREATED_DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_DATE CREATED_BY VARCHAR2 (20 BYTE) CATE_LAST_UPDATED_DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (2000 BYTE)       DATE     C2000 BYTE)       DATE     C2000 BYTE)       DATE     CARCHAR2 (200 BYTE)       DATE     LAST_UPDATED       DATE     LAST_UPDATED_BY       VARCHAR2 (20 BYTE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * OROUP_NUMBER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       PF * NAME     VARCHAR2 (20 BYTE)       PF * NAME     VARCHAR2 (3
MAPPING, SOURCE_INFO     VARCHAR2 (15 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (100 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED_DATE     DATE       LIK_AGE_EVENT     P       * DESCRIPTION     VARCHAR2 (40 BYTE)       * DESCRIPTION     VARCHAR2 (2000 BYTE)       DATE_CREATED_DATE     DATE       LINK     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LINK     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK_ANCESTRAL_POPULATION     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)	PF * MARKER_PREFERRED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_OURCE_INFO MAPPING_UPDATE_FLAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_IAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE COMMENTS VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) DATE_CREATED DATE LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) LK_CELL_POPULATION	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       DATE     CREATED       DATE     CREATED       DATE     CREATED       DATE     LAST       UPDATED_BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED_DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LK     CONCENTRATION TO PG ML       PF * NAME     VARCHAR2 (50 BYTE)       * FACTOR     NUMBER (38)       DATE     DATE
MAPPING     SOURCE_INFO     VARCHAR2 (16 DTTE)       MAPPING_UPDATE_FLAG     VARCHAR2 (17 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (10 DTTE)       COMMENTS     VARCHAR2 (10 DTTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     AGE       EXACCHAR2 (20 BYTE)     DATE       LAST_UPDATED_DATE     DATE       CREATED_BY     VARCHAR2 (1000 BYTE)       DATE_CREATED_DATE     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     LATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     LK       ANCESTRAL_POPULATION     P       P * NAME     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (20 DYTE)	PF + MARKER_PREFERRED VARCHAR2 (150 BYTE) P + MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) COMMENTS VARCHAR2 (20 BYTE) VARCHAR2 (200 BYTE) COMMENTS VARCHAR2 (200 BYTE) COMMENTS VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_CREATED_DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_DATE CREATED_BY VARCHAR2 (20 BYTE) CATE_LAST_UPDATED_DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       DATE     CONTRATE       DATE     CREATED       DATE     CREATED       DATE     CREATED       DATE     CONTE       DATE     CONTE       DATE     DATE       CREATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       DATE     CREATED       DATE     CREATED_BY       VARCHAR2 (20 BYTE)     DATE       * VALUE     NUMBER (38)       DATE     CREATED_DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LK     CONCENTRATION TO PG ML       PF * NAME     VARCHAR2 (50 BYTE)       * FACTOR     NUMBER (38)       DATE_CREATED     DATE
MAPPING SOURCE INFO     VARCHAR2 (16 BYTE)       MAPPING UPDATE_FLAG     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (100 BYTE)       SORT ORDER     NUMBER       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED BY     VARCHAR2 (20 BYTE)       VARCHAR2 (20 BYTE)     DATE       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       VARCHAR2 (1000 BYTE)     UNACHAR2 (2000 BYTE)       DATE CREATED     DATE       CREATED BY     VARCHAR2 (2000 BYTE)       DATE CREATED     DATE       CREATED DATE     CREATED DATE       CREATED DATE     DATE       CREATED DATE     DATE       LAST_UPDATED DATE     DATE       LAST_UPDATED DATE     DATE       LAST_UPDATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (2000 BYTE)	PF + MARKER_PREFERRED VARCHAR2 (150 BYTE) P + MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_FLAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) VARCHAR2 (150 BYTE) LIK CELL POPULATION MARKER P + NAME VARCHAR2 (100 BYTE) LINK VARCHAR2 (100 BYTE) LINK VARCHAR2 (100 BYTE) LINK VARCHAR2 (20 BYTE) DATE CREATED DATE CREATED DATE CREATED DATE LINK VARCHAR2 (100 BYTE) LINK VARCHAR2 (20 BYTE) DATE CREATED DATE CREATED DATE CREATED DATE LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) CREATED DATE CREATED DATE CREATED DATE CREATED DATE CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE LAST_UPDATED_DATE LAST_UPDATED_DATE LAST_UPDATED_DATE LAST_UPDATED_DATE LAST_UPDATED_DATE LAST_UPDATED_DATE LAST_UPDATED_DATE LAST_UPDATED_DATE LAST_UPDATED_DATE CREATED DATE CREATED DATE CREA	P * NAME     VARCHAR2 (40 BYTE)       DESCRIPTION     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * ADTERN     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     LAST_UPDATED_DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION TO PG ML       PF * NAME     VARCHAR2 (50 BYTE)       * FACTOR     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)
MAPPING     SOURCE_INFO     VARCHAR2 (16 DETE)       MAPPING_UPDATE_FLAG     VARCHAR2 (175 DETE)       VARCHAR2 (175 DETE)     VARCHAR2 (100 DETE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 DETE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 DETE)       VARCHAR2 (20 DETE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 DETE)       VARCHAR2 (1000 DETE)     UNTE)       LINK     VARCHAR2 (1000 DETE)       DATE_CREATED     DATE       CREATED_DATE     DATE       CREATED_DATE     DATE       LINK     VARCHAR2 (2000 BETE)       DATE_LAST_UPDATED     DATE       CREATED_DATE     DATE       CREATED_DATE     DATE       LAST_UPDATED_DATE     DATE       LAST_UPDATED_DATE     DATE       LAST_UPDATED_DATE     DATE       LAST_UPDATED_DATE     DATE       ABBREVIATION     VARCHAR2 (30 DETE)       ABBREVIATION     VARCHAR2 (30 DETE)       ABBREVIATION     VARCHAR2 (30 DETE)       LINK     VARCHAR2 (200 DETE)	PF + MARKER_PREFERRED VARCHAR2 (150 BYTE) P + MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED BY VARCHAR2 (20 BYTE) <b>LK CELL POPULATION MARKER</b> P + NAME VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED BY VARCHAR2 (200 BYTE) DATE_CREATED DATE LLSCRIPTION VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED BY VARCHAR2 (200 BYTE) DATE_CREATED DATE LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE_CREATED DATE LAST_UPDATED DATE LAST_UPDATED DATE LAST_UPDATED DATE LAST_UPDATED DATE LAST_UPDATED DATE LAST_UPDATED BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) CREATED_BY VARCHAR2 (500 BYTE) CREATED_BY VARCHAR2	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       DATE     CARCHAR2 (200 BYTE)       DATE     CARCHAR2 (200 BYTE)       DATE     LAST_UPDATED       DATE     LAST_UPDATED_BY       VARCHAR2 (20 BYTE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION TO PG ML       PF * NAME     VARCHAR2 (50 BYTE)       * FACTOR     NUMBER (38)       DATE_CREATED_DY     VARCHAR2 (20 BYTE)       * FACTOR     NUMBER (38)       DATE_CREATED_DY     VARCHAR2 (20 BYTE)
MAPPING SOURCE INFO     VARCHAR2 (50 BYTE)       MAPPING UPDATE_ILAG     VARCHAR2 (1 BYTE)       MAPPING UPDATE_USAGE     VARCHAR2 (200 BYTE)       SORT ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED_BY     VARCHAR2 (20 BYTE)       LIK     AGE       EVENT     P       * NAME     VARCHAR2 (40 BYTE)       * DESCRIPTION     VARCHAR2 (2000 BYTE)       DATE_CREATED_DATE     DATE       LINK     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_DATE     DATE       DATE_CREATED_DATE     DATE       LAST_UPDATED_SVARCHAR2 (20 BYTE)     DATE       DAST_UPDATED_SVARCHAR2 (30 BYTE)     ABBREVIATION       P * NAME     VARCHAR2 (30 BYTE) <t< td=""><td>PF * MARKER_PREFERRED     VARCHAR2 (150 BYTE)       P * MARKER_REPORTED     VARCHAR2 (150 BYTE)       MAPPING_SOURCE_INFO  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MAPPING SOURCE INFO     VARCHAR2 (16 DTTE)       MAPPING UPDATE_FLAG     VARCHAR2 (15 DTTE)       MAPPING UPDATE_USAGE     VARCHAR2 (10 DTTE)       COMMENTS     VARCHAR2 (10 DTTE)       SORT ORDER     NUMBER       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       VARCHAR2 (20 BYTE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LOOD BYTED     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LK     ANCESTRAL       P * NAME     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (20 DATE       CREATED_DY     VARCHAR2 (20 DATE)   <	PF + MARKER_PREFERRED VARCHAR2 (150 BYTE) P + MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED DATE LAST_UPDATED VARCHAR2 (100 BYTE) DATE_CREATED DATE VARCHAR2 (100 BYTE) VARCHAR2 (20 BYTE) DATE_CREATED DATE LINK VARCHAR2 (100 BYTE) DATE_CREATED DATE CREATED DATE CREATED DATE LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED DATE LAST_UPDATED DATE LINK VARCHAR2 (200 BYTE) DATE_CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE_CREATED DATE LAST_UPDATED VARCHAR2 (20 BYTE) DATE_LAST_UPDATED VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) DESCRIPTION VARCHAR2 (150 BYTE) U DEFINITION VARCHAR2 (150 BYTE) VARCHAR2 (1000 BYTE) DATE_DATED_SYTE) DATE_DATED_SYTE) DATE_DATED_SYTE) DATE_DATED_SYTE) DATE_DATED_SYTE) DATE_DATED_SYTE) DATE_DATED_SYTE) DATE_DATED_SYTE) DATE_DATED_DATED_DATE DATE_DATED_DATE DATE_DATED_DATED_DATE DATE_DATED_SYTE) DATE_DATED_DATE DATE_DATED_DATED_DATE DATE_DATED_DATE DATE_DATED_DATED_DATE DATE_DATED_DATED_DATE DATE_DATED_DATED_DATE DATE_DATED_DATED_DATED_DATED_DATE DATE_DATED_DAT	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       DATE     C2000 BYTE)       DATE     CREATED DATE       CREATED BY     VARCHAR2 (200 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION TO PG ML       PF * NAME     VARCHAR2 (20 BYTE)       * FACTOR     NUMBER (38)       DATE_CREATED_DY     VARCHAR2 (20 BYTE)       * FACTOR     NUMBER (38)       DATE_CREATED_DY     VARCHAR2 (20 BYTE)
MAPPING_SOURCE_INFO     VARCHAR2 (50 BYTE)       MAPPING_UPDATE_IELAG     VARCHAR2 (13 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (200 BYTE)       DATE_CREATED_DATE     DATE       LOBSCRIPTION     VARCHAR2 (2000 BYTE)       DATE_CREATED_DATE     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       ABBREVIATION     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (2000 BYTE)       DATE_CREATED_DATE     DATE       CREATED_DATE     DATE       DATE_CREATED_DATE     DATE       DATE_CREATED_DATE     DATE       DATE_CREATED_DATE     DATE       DATE_CREATED_DATE     DATE       DATE_CREATED_DATE     DATE       DA	PF + MARKER_PREFERRED VARCHAR2 (150 BYTE) P + MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_ILAG VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) DATE_CREATED_BY VARCHAR2 (20 BYTE) LK CELL POPULATION MARKER P * NAME VARCHAR2 (200 BYTE) DATE_CREATED_DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED_DATE LLSCRIPTION VARCHAR2 (200 BYTE) DATE_CREATED_DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED_DATE LAST_UPDATED_DATE CREATED_BY VARCHAR2 (200 BYTE) DATE_CREATED_DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_DATE CREATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED_DATE LAST_UPDATED_BY VARCHAR2 (500 BYTE) U DEFINITON_VARCHAR2 (150 BYTE) U DEFINITON_VARCHAR2 (200 BYTE) LINK_VARCHAR2 (200 BYTE) LINK_VARCHAR2 (200 BYTE)	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       DESCRIPTION     VARCHAR2 (1000 BYTE)       DATE     CREATED       DATE     CREATED       DATE     CREATED       DATE     LAST_UPDATED       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * DIGITS_TO     VARCHAR2 (50 BYTE)       * ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP_NUMBER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       VALUE     NUMBER (38)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LK     CONCENTRATION TO PG ML       PF * NAME     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)  <
MAPPING SOURCE INFO     VARCHAR2 (16 DTTE)       MAPPING UPDATE_FLAG     VARCHAR2 (15 DTTE)       MAPPING UPDATE_USAGE     VARCHAR2 (10 DTTE)       COMMENTS     VARCHAR2 (10 DTTE)       SORT ORDER     NUMBER       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       VARCHAR2 (20 BYTE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LOOD BYTED     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_DATE     DATE       LK     ANCESTRAL       P * NAME     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       LINK     VARCHAR2 (20 DATE       CREATED_DY     VARCHAR2 (20 DATE)   <	PF + MARKER_PREFERRED VARCHAR2 (150 BYTE) P + MARKER_REPORTED VARCHAR2 (150 BYTE) MAPPING_SOURCE_INFO MAPPING_UPDATE_FLAG VARCHAR2 (150 BYTE) MAPPING_UPDATE_USAGE VARCHAR2 (150 BYTE) COMMENTS VARCHAR2 (150 BYTE) SORT_ORDER NUMBER (38) DATE_CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE_LAST_UPDATED DATE LAST_UPDATED_BY VARCHAR2 (20 BYTE) VARCHAR2 (150 BYTE) VARCHAR2 (150 BYTE) VARCHAR2 (1000 BYTE) LINK VARCHAR2 (1000 BYTE) LINK VARCHAR2 (1000 BYTE) DATE CREATED DATE CREATED DATE CREATED DATE CREATED DATE LAST_UPDATED_DATE LINK VARCHAR2 (150 BYTE) DATE CREATED BY VARCHAR2 (2000 BYTE) DATE CREATED DATE CREATED DATE CREATED DATE CREATED BY VARCHAR2 (20 BYTE) DATE CREATED BY VARCHAR2 (20 BYTE) DATE COMMENTS VARCHAR2 (150 BYTE) U DEFINITION VARCHAR2 (150 BYTE) U DEFINITION VARCHAR2 (150 BYTE) DESCRIPTION VARCHAR2 (150 BYTE) U DEFINITION VARCHAR2 (150 BYTE) DESCRIPTION VARCHAR2 (150 BYTE) DATE CREATED DATE LINK VARCHAR2 (150 BYTE) DESCRIPTION VARCHAR2 (150 BYTE) DESCRIP	P * NAME       VARCHAR2 (40 BYTE)         DESCRIPTION       VARCHAR2 (1000 BYTE)         DATE       CREATED         DATE       CREATED         DATE       CREATED         DATE       CREATED         DATE       LINK         VARCHAR2 (200 BYTE)         DATE       CREATED         DATE       LAST_UPDATED         LAST_UPDATED_BY       VARCHAR2 (20 BYTE)         LAST_UPDATED_BY       VARCHAR2 (50 BYTE)         * DIGITS_TO       VARCHAR2 (50 BYTE)         * DIGITS_TO       VARCHAR2 (50 BYTE)         * DATEERN       VARCHAR2 (50 BYTE)         * OD_SUBTRACT       VARCHAR2 (50 BYTE)         * GROUP_NUMBER       NUMBER (38)         DATE_CREATED       DATE         CREATED_BY       VARCHAR2 (20 BYTE)         DATE_CREATED       DATE         LAST_UPDATED_BY       VARCHAR2 (20 BYTE)         DATE_CREATED_BY       VARCHAR2 (20 BYTE)         LK       CONCENTRATION TO PG ML         PF * NAME       VARCHAR2 (20 BYTE)         * FACTOR       NUMBER (38)         DATE_CREATED       DATE         CREATED_BY       VARCHAR2 (20 BYTE)         DATE_CREATED       DATE
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MAPPING, SOURCE_INFO     VARCHAR2 (15 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     AGE EVENT       P * NAME     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LAST_UPDATED_DATE     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       DATE_CREATED     DATE       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       DATE_CREATED     DATE       DATE_CREATED     DATE       DATE_CREATED     DATE       D	PF * MARKER_PREFERRED     VARCHAR2 (150 BYTE)       P * MARKER_REPORTED     VARCHAR2 (150 BYTE)       MAPPING_SOURCE_INFO     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_LAG     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (150 BYTE)       SORT_ORDER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE     UPDATED_BY       VARCHAR2 (150 BYTE)     VARCHAR2 (20 BYTE)       DATE     CELL POPULATION MARKER       P * NAME     VARCHAR2 (150 BYTE)       LINK     VARCHAR2 (1000 BYTE)       DATE     CREATED       DATE     COMBENTS       VARCHAR2 (20 BYTE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED       CREATED BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED       DATE     COMMENTS       VARCHAR2 (150 BYTE)     COMMENTS       VARCHAR2 (150 BYTE)     DESCRIPTION       VARCHAR2 (150 BYTE)     DESCRIPTION       VARCHAR2 (150 BYTE)     DATE       DATE     CARCHAR2 (1000 BYTE)       DATE     VARCHAR2 (200 BYTE)       DATE     DATE	P * NAME     VARCHAR2 (40 BYTE) DESCRIPTION       VARCHAR2 (1000 BYTE) DATE CREATED     VARCHAR2 (200 BYTE) DATE (2000 BYTE) DATE (2000 BYTE) DATE (2000 BYTE) DATE LAST UPDATED DATE       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (20 BYTE)       LK     CONCENTRATION ROUNDING       P * NAME     VARCHAR2 (50 BYTE)       DIGITS TO     VARCHAR2 (50 BYTE)       * DIGITS TO     VARCHAR2 (50 BYTE)       * OLIGITS TO     VARCHAR2 (50 BYTE)       * GROUP NUMBER     NUMBER (38)       DATE (STENTED BY     VARCHAR2 (50 BYTE)       * GROUP NUMBER     NUMBER (38)       DATE (CREATED DATE     DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE LAST UPDATED DATE     LAST_UPDATED DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE CREATED DATE     CREATED BY       VARCHAR2 (20 BYTE)     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE CREATED DATE     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE LAST UPDATED DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE LAST UPDATED DATE     LAST_UPDATED DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE LAST UPDATED DATE     DATE       LK CRITERION CATEGORY     VARCHAR2 (20 BYTE) <tr< td=""></tr<>
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MAPPING, SOURCE_INFO     VARCHAR2 (15 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     AGE EVENT       P * NAME     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LAST_UPDATED_DATE     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       DATE_CREATED     DATE       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       DATE_CREATED     DATE       DATE_CREATED     DATE       DATE_CREATED     DATE       D	PF * MARKER_PREFERRED     VARCHAR2 (150 BYTE)       P * MARKER_REPORTED     VARCHAR2 (150 BYTE)       MAPPING_SOURCE_INFO     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_LAG     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (150 BYTE)       SORT_ORDER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE     UPDATED_BY       VARCHAR2 (150 BYTE)     VARCHAR2 (20 BYTE)       DATE     CELL POPULATION MARKER       P * NAME     VARCHAR2 (150 BYTE)       LINK     VARCHAR2 (1000 BYTE)       DATE     CREATED       DATE     COMBENTS       VARCHAR2 (20 BYTE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED       CREATED BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED       DATE     COMMENTS       VARCHAR2 (150 BYTE)     COMMENTS       VARCHAR2 (150 BYTE)     DESCRIPTION       VARCHAR2 (150 BYTE)     DESCRIPTION       VARCHAR2 (150 BYTE)     DATE       DATE     CARCHAR2 (1000 BYTE)       DATE     VARCHAR2 (200 BYTE)       DATE     DATE	P * NAME     VARCHAR2 (40 BYTE)       DESCRIPTION     VARCHAR2 (1000 BYTE)       DATE     CORCHAR2 (200 BYTE)       DATE     CREATED       DATE     CREATED       DATE     LINK       VARCHAR2 (200 BYTE)     DATE       DATE     LAST_UPDATED       DATE     LAST_UPDATED       DATE     LAST_UPDATED       DATE     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED_BY       VARCHAR2 (50 BYTE)     DIGITS_TO       VARCHAR2 (50 BYTE)     DIGITS_TO       VARCHAR2 (50 BYTE)     ADD SUBTRACT       ADD SUBTRACT     VARCHAR2 (50 BYTE)       ADD SUBTRACT     VARCHAR2 (50 BYTE)       ADD SUBTRACT     VARCHAR2 (20 BYTE)       DATE     CREATED DATE       CREATED BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED_DY     VARCHAR2 (20 BYTE) <t< td=""></t<>
MAPPING, SOURCE_INFO     VARCHAR2 (15 BYTE)       MAPPING_UPDATE_ILAG     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (15 BYTE)       COMMENTS     VARCHAR2 (200 BYTE)       SORT_ORDER     NUMBER       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       LK     AGE EVENT       P * NAME     VARCHAR2 (1000 BYTE)       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LAST_UPDATED_DATE     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       ABBREVIATION     VARCHAR2 (30 BYTE)       DATE_CREATED     DATE       LINK     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       CREATED BY     VARCHAR2 (2000 BYTE)       DATE_CREATED     DATE       DATE_CREATED     DATE       DATE_CREATED     DATE       DATE_CREATED     DATE       D	PF * MARKER_PREFERRED     VARCHAR2 (150 BYTE)       P * MARKER_REPORTED     VARCHAR2 (150 BYTE)       MAPPING_SOURCE_INFO     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_LAG     VARCHAR2 (150 BYTE)       MAPPING_UPDATE_USAGE     VARCHAR2 (150 BYTE)       SORT_ORDER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE     UPDATED_BY       VARCHAR2 (150 BYTE)     VARCHAR2 (20 BYTE)       DATE     CELL POPULATION MARKER       P * NAME     VARCHAR2 (150 BYTE)       LINK     VARCHAR2 (1000 BYTE)       DATE     CREATED       DATE     COMBENTS       VARCHAR2 (20 BYTE)     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED       CREATED BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED       DATE     COMMENTS       VARCHAR2 (150 BYTE)     COMMENTS       VARCHAR2 (150 BYTE)     DESCRIPTION       VARCHAR2 (150 BYTE)     DESCRIPTION       VARCHAR2 (150 BYTE)     DATE       DATE     CARCHAR2 (1000 BYTE)       DATE     VARCHAR2 (200 BYTE)       DATE     DATE	P * NAME     VARCHAR2 (40 BYTE)       DESCRIPTION     VARCHAR2 (1000 BYTE)       DATE     CREATED       DATE     CREATED       DATE     CREATED       DATE     LINK       VARCHAR2 (200 BYTE)       DATE     CREATED       DATE     LAST_UPDATED       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE     LAST_UPDATED_BY       VARCHAR2 (50 BYTE)       DATE     VARCHAR2 (50 BYTE)       * DIGITS TO     VARCHAR2 (50 BYTE)       * DIGITS TO     VARCHAR2 (50 BYTE)       * ADD_SUBTRACT     VARCHAR2 (50 BYTE)       * GROUP, NUMBER     NUMBER (38)       DATE_CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE_CREATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE LAST_UPDATED     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE CREATED     DATE       CREATED_BY     VARCHAR2 (20 BYTE)       DATE CREATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE CREATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE CREATED_DATE     DATE       LAST_UPDATED_BY     VARCHAR2 (20 BYTE)       DATE CREATED_DATE </td

### 3.3.1.11. Lookup Tables - Part 2

	LK DATA	COMPLETENESS
• * I[	<u> </u>	NUMBER (38)
D	ESCRIPTION	VARCHAR2 (1000 BYTE)
	DATE_CREATED	DATE
	REATED_BY	VARCHAR2 (20 BYTE)
D	DATE_LAST_UPDATED	DATE
L	AST_UPDATED_BY	VARCHAR2 (20 BYTE)
	LK	DISEASE
* N	IAME	VARCHAR2 (250 BYTE)
* C	DISEASE_ONTOLOGY_IE	VARCHAR2 (50 BYTE)
* C	DESCRIPTION	VARCHAR2 (1000 BYTE)
L	INK	VARCHAR2 (2000 BYTE)
	DATE_CREATED	DATE
C	REATED_BY	VARCHAR2 (20 BYTE)
D	DATE_LAST_UPDATED	DATE
L	AST_UPDATED_BY	VARCHAR2 (20 BYTE)
H	IUMAN_PHENOTYPE_ID	VARCHAR2 (50 BYTE)
P * 1		
	NAME DESCRIPTION	VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE)
	LINK	VARCHAR2 (1000 BYTE)
	DATE CREATED	
		DATE VARCHAR2 (20 BYTE)
(		
	DATE_LAST_UPDATED	
	AST_OPDATED_BT	VARCHAR2 (20 BYTE)
	LK E	ETHNICITY
•	NAME	VARCHAR2 (50 BYTE)
	DESCRIPTION	VARCHAR2 (1000 BYTE)
	INK	VARCHAR2 (2000 BYTE)
0	DATE CREATED	DATE
C	CREATED BY	VARCHAR2 (20 BYTE)
0	DATE_LAST_UPDATED	DATE
L	AST_UPDATED_BY	VARCHAR2 (20 BYTE)
	LK EXP ME	ASUREMENT TECH
P * 1	NAME	VARCHAR2 (50 BYTE)
	DESCRIPTION	VARCHAR2 (1000 BYTE)
	INK	VARCHAR2 (2000 BYTE)
	DATE CREATED	DATE
	CREATED BY	VARCHAR2 (20 BYTE)
г	JATE LAST UPDATED	DATE
Г	DATE_LAST_UPDATED _AST_UPDATED_BY	DATE VARCHAR2 (20 BYTE)
г	AST_UPDATED_BY	VARCHAR2 (20 BYTE)
Ľ	AST_UPDATED_BY	VARCHAR2 (20 BYTE) SURE_MATERIAL
[       P * N	AST_UPDATED_BY	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE)
[   	AST_UPDATED_BY	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (50 BYTE)
[ L P * N * E * [	AST_UPDATED_BY LK_EXPOS VAME EXPOSURE_MATERIAL_ DESCRIPTION	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE)
[ L P * M * E * [ L	AST_UPDATED_BY LK_EXPOS VAME EXPOSURE_MATERIAL_ DESCRIPTION LINK	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (2000 BYTE)
[   	AST_UPDATED_BY LK_EXPOS VAME EXPOSURE_MATERIAL_ DESCRIPTION INK DATE_CREATED	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (2000 BYTE) DATE
[ L P * M * E * C L C	AST_UPDATED_BY LK_EXPOS VAME EXPOSURE_MATERIAL_ DESCRIPTION .INK DATE_CREATED .REATED_BY	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (200 BYTE) VARCHAR2 (2000 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE)
[   L   P * M   * E   * C   L   C   C	AST_UPDATED_BY LK_EXPOS VAME EXPOSURE_MATERIAL_ DESCRIPTION INK DATE_CREATED	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) DATE
] L P * M E X L C C	AST_UPDATED_BY LK_EXPOS VAME EXPOSURE_MATERIAL_ DESCRIPTION INK DATE_CREATED YATE LAST_UPDATED	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)
[   L   P * M   * E   * C   L   C   C	AST_UPDATED_BY LK_EXPOSINE XAME XPOSURE_MATERIAL_ DESCRIPTION INK JATE_CREATED SREATED_BY JATE_LAST_UPDATED_BY AST_UPDATED_BY	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (50 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) ATE
P * N * E * C C C	AST_UPDATED_BY LK EXPOS VAME EXPOSURE_MATERIAL_ DESCRIPTION JNK DATE_CREATED SREATED_BY DATE_LAST_UPDATED_BY LK EXPOSURE	VARCHAR2 (20 BYTE) SURE_MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (200 BYTE) VARCHAR2 (2000 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) A MATERIAL_PREF_MAP
P * 1 * E * [ [ [ [ ]	AST_UPDATED_BY LK_EXPOS VAME EXPOSURE_MATERIAL_ DESCRIPTION JNK DATE_CREATED REATED_BY DATE_LAST_UPDATED_BY LK_EXPOSURE EXPOSURE_MATERIAL EXPOSURE_MATERIAL	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (50 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) ATE MATERIAL PREF MAP REPORTED VARCHAR2 (200 BYTE)
P * 1 P * 1 * [ C C C F * 1	AST_UPDATED_BY LK_EXPOSURE_MATERIAL_ DESCRIPTION JNK JNK SREATED_BY DATE_LAST_UPDATED_BY LK_EXPOSURE_MATERIAL_ EXPOSURE_MATERIAL_ EXPOSURE_MATERIAL	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) D VARCHAR2 (300 BYTE) VARCHAR2 (300 BYTE) DATE VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) T MATERIAL PREF MAP REPORTED VARCHAR2 (200 BYTE) PREFERRED VARCHAR2 (200 BYTE)
P * 1 * E * C C C F * 1	AST_UPDATED_BY LK EXPOSING EXPOSURE_MATERIAL_ DESCRIPTION JINK DATE_CREATED REATED_BY DATE_LAST_UPDATED_BY LK EXPOSURE_MATERIAL_ EXPOSURE_MATERIAL_ EXPOSURE_MATERIAL_ EXPOSURE_MATERIAL_ EXPOSURE_MATERIAL_	VARCHAR2 (20 BYTE)           SURE_MATERIAL           VARCHAR2 (200 BYTE)           D VARCHAR2 (500 BYTE)           VARCHAR2 (2000 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           PATE           VARCHAR2 (20 BYTE)           PREPORTED           VARCHAR2 (200 BYTE)           PREFERRED           VARCHAR2 (200 BYTE)           VARCHAR2 (200 BYTE)           VARCHAR2 (200 BYTE)
P * N * E * C C C C C F * I	AST_UPDATED_BY LK_EXPOS UAME EXPOSURE_MATERIAL_ DESCRIPTION JNK DATE_CREATED REATED_BY DATE_LAST_UPDATED_BY LK_EXPOSURE_MATERIAL_ EXPOSURE_MATERIAL_ COMMENTS DATE_CREATED	VARCHAR2 (20 BYTE) SURE MATERIAL VARCHAR2 (200 BYTE) ID VARCHAR2 (300 BYTE) VARCHAR2 (300 BYTE) DATE VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) REPORTED PREFERRED VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE
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LK EXPOSU	RE PROCESS
P * NAME	VARCHAR2 (100 BYTE)
* DESCRIPTION	VARCHAR2 (1000 BYTE)
LINK DATE CREATED	VARCHAR2 (2000 BYTE) DATE
CREATED BY	VARCHAR2 (20 BYTE)
DATE_LAST_UPDATED LAST_UPDATED_BY	DATE
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
LK EXPSAMPLE	RESULT SCHEMA
P * NAME	VARCHAR2 (50 BYTE)
DESCRIPTION	VARCHAR2 (1000 BYTE)
* TABLE_NAME	VARCHAR2 (30 BYTE)
DATE_CREATED CREATED BY	DATE VARCHAR2 (20 BYTE)
DATE_LAST_UPDATED	DATE
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
	DER_PATTERN
P * NAME	VARCHAR2 (150 BYTE)
* VALUE	VARCHAR2 (150 BYTE) VARCHAR2 (500 BYTE)
* REGULAR_EXPRESSION * PATTERN_TYPE	VARCHAR2 (50 BYTE)
* DESCRIPTION	VARCHAR2 (1000 BYTE)
LINK	VARCHAR2 (2000 BYTE)
DATE_CREATED CREATED BY	DATE VARCHAR2 (20 BYTE)
DATE_LAST_UPDATED	DATE
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
	DETAIL
P * NAME DESCRIPTION	VARCHAR2 (100 BYTE) VARCHAR2 (1000 BYTE)
LINK	VARCHAR2 (2000 BYTE)
DATE_CREATED	DATE
CREATED_BY	VARCHAR2 (20 BYTE)
DATE_LAST_UPDATED LAST_UPDATED_BY	DATE VARCHAR2 (20 BYTE)
LK FILE SYST	EM OPERATION
P * NAME	VARCHAR2 (50 BYTE)
DESCRIPTION DATE CREATED	VARCHAR2 (1000 BYTE) DATE
CREATED BY	VARCHAR2 (20 BYTE)
DATE_LAST_UPDATED LAST_UPDATED_BY	DATE
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
	STEM STATUS
P * NAME	VARCHAR2 (50 BYTE)
DESCRIPTION	VARCHAR2 (1000 BYTE)
DATE_CREATED	DATE
CREATED_BY DATE_LAST_UPDATED	VARCHAR2 (20 BYTE) DATE
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
P * NAME	ENDER VARCHAR2 (20 BYTE)
DESCRIPTION	VARCHAR2 (20 BTTE)
LINK	VARCHAR2 (2000 BYTE)
DATE_CREATED CREATED BY	
DATE LAST UPDATED	VARCHAR2 (20 BYTE) DATE
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)

LK_HN	1DB
P * HMDB_ID	VARCHAR2 (15 BYTE)
	VARCHAR2 (255 BYTE)
	VARCHAR2 (4000 BYTE)
	VARCHAR2 (2000 BYTE)
	DATE
	VARCHAR2 (20 BYTE)
	DATE
	VARCHAR2 (20 BYTE)
LAST_OFDATED_BT	VARCHARZ (ZU BITE)
LK_LAB_TE	
P * NAME	VARCHAR2 (50 BYTE)
CDISC_LAB_TEST_CODE	
DESCRIPTION	VARCHAR2 (1000 BYTE)
LAB_TEST_PANEL_NAME	VARCHAR2 (50 BYTE)
LINK	VARCHAR2 (2000 BYTE)
DATE CREATED	DATE
CREATED BY	VARCHAR2 (20 BYTE)
DATE LAST UPDATED	DATE
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
LK LAB TEST	PANEL NAME
P * NAME	VARCHAR2 (125 BYTE)
DESCRIPTION	VARCHAR2 (1000 BYTE)
LINK	VARCHAR2 (2000 BYTE)
DATE_CREATED	DATE
CREATED BY	VARCHAR2 (20 BYTE)
DATE LAST UPDATED	DATE
	VARCHAR2 (20 RVTE)
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
LK_LOCUS	S NAME VARCHAR2 (100 BYTE)
LK LOCUS	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE)
LK_LOCUS P * NAME DESCRIPTION LINK	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) VARCHAR2 (2000 BYTE)
LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) VARCHAR2 (2000 BYTE) DATE
E LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE)
LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) DATE
E LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE)
LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)
LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK_MASS_SPECTI	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) ROMETRY TYPE
LK_LOCUS         P * NAME         DESCRIPTION         LINK         DATE_CREATED         CREATED_BY         DATE_LAST_UPDATED         LAST_UPDATED_BY         LK_MASS_SPECTI         P * NAME	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) DATE VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) ROMETRY TYPE VARCHAR2 (50 BYTE)
LK     LOCUS       P * NAME     DESCRIPTION       LINK     DATE_CREATED       CREATED_BY     DATE_LAST_UPDATED       LAST_UPDATED_BY     LK       LK     MASS_SPECTION       P * NAME     DESCRIPTION	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) ROMETRY TYPE VARCHAR2 (50 BYTE) VARCHAR2 (4000 BYTE)
LK         LOCUS           P * NAME         DESCRIPTION           LINK         DATE_CREATED           DATE_LAST_UPDATED         LAST_UPDATED_BY           LK         MASS_SPECTI           P * NAME         DESCRIPTION           LINK         LK	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (250 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (200 BYTE)           VARCHAR2 (200 BYTE)
LK_LOCUS       P * NAME       DESCRIPTION       LINK       DATE_CREATED       CREATED_BY       DATE_LAST_UPDATED_BY       LK_MASS_SPECTION       LINK       DATE_CREATED	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (200 BYTE) DATE VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (2000 BYTE) VARCHAR2 (2000 BYTE) DATE
LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY LK MASS_SPECTI P * NAME DESCRIPTION LINK DATE_CREATED CREATED BY	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE)
LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK MASS_SPECTI P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (250 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           ROMETRY TYPE           VARCHAR2 (50 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           DATE           VARCHAR2 (20 BYTE)
LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY LK MASS_SPECTI P * NAME DESCRIPTION LINK DATE_CREATED CREATED BY	S NAME VARCHAR2 (100 BYTE) VARCHAR2 (250 BYTE) DATE VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) ROMETRY TYPE VARCHAR2 (20 BYTE) VARCHAR2 (2000 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE)
LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK MASS_SPECTI P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (250 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           ROMETRY TYPE           VARCHAR2 (50 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           DATE           VARCHAR2 (20 BYTE)
LK LOCUS         P * NAME         DESCRIPTION         LINK         DATE CREATED         CREATED_BY         DATE_LAST_UPDATED_BY         LK MASS_SPECTION         LINK         DATE CREATED         DATE CREATED         DATE_CREATED         CREATED_BY	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (250 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (200 BYTE)           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)
LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY LK MASS SPECTI P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY LK ONT	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (2050 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           OLOGY
LK LOCUS         P * NAME         DESCRIPTION         LINK         DATE_CREATED         CREATED_BY         DATE_LAST_UPDATED_BY         LK MASS SPECTION         LINK         DATE_CREATED         CREATED_BY         LK MASS SPECTION         LINK         DATE_CREATED         CREATED_BY         DATE_LAST_UPDATED         LAST_UPDATED_BY	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (200 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           OLOGY           VARCHAR2 (50 BYTE)
LK LOCUS         P * NAME         DESCRIPTION         LINK         DATE CREATED         CREATED_BY         DATE_LAST_UPDATED         LAST_UPDATED_BY         LK MASS_SPECTION         LINK         DATE_CREATED         CREATED_BY         LK MASS_SPECTION         LINK         DATE_CREATED         CREATED_BY         DATE_LAST_UPDATED         LAST_UPDATED_BY         LK ONT         P * NAME         DESCRIPTION	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (250 BYTE)           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)
LK_LOCUS       P * NAME       DESCRIPTION       LINK       DATE_CREATED       CREATED_BY       DATE_LAST_UPDATED_BY       LK_MASS_SPECTI       P * NAME       DESCRIPTION       LINK       DATE_CREATED       CREATED_BY       DATE_CREATED       CREATED_BY       DATE_CREATED       CREATED_BY       DATE_CREATED       CAREATED_BY       DATE_LAST_UPDATED_BY       LK_ONT       P * NAME       DESCRIPTION       LINK	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (200 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)
LK       LOCUS         P * NAME       DESCRIPTION         LINK       DATE_CREATED         CREATED_BY       DATE_LAST_UPDATED         DATE_CREATED       CREATED         CREATED_BY       LK         MANE       DESCRIPTION         LINK       DATE_CREATED         CREATED_BY       DATE_CREATED         LAST_UPDATED_BY       LK         DATE_CREATED       CREATED_BY         LAST_UPDATED_BY       LK_ONT         P * NAME       DESCRIPTION         LINK       DATE_CREATED         VAME       DESCRIPTION         LINK       DATE_CREATED	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (250 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (200 BYTE)           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           OLOGY           VARCHAR2 (1000 BYTE)           VARCHAR2 (2000 BYTE)           DATE           VARCHAR2 (200 BYTE)
LK LOCUS P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY LK MASS SPECTI P * NAME DESCRIPTION LINK DATE_CREATED CREATED_BY LK_ONT P * NAME DESCRIPTION LINK DATE_CREATED CREATED BY LK_ONT	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (200 BYTE)
LK       LOCUS         P * NAME       DESCRIPTION         LINK       DATE_CREATED         CREATED_BY       DATE_LAST_UPDATED         DATE_CREATED       CREATED         CREATED_BY       LK         MANE       DESCRIPTION         LINK       DATE_CREATED         CREATED_BY       DATE_CREATED         LAST_UPDATED_BY       LK         DATE_CREATED       CREATED_BY         LAST_UPDATED_BY       LK_ONT         P * NAME       DESCRIPTION         LINK       DATE_CREATED         VAME       DESCRIPTION         LINK       DATE_CREATED	S NAME           VARCHAR2 (100 BYTE)           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (200 BYTE)           DATE           VARCHAR2 (20 BYTE)           DATE           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (50 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (2000 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (20 BYTE)           VARCHAR2 (200 BYTE)

#### 3.3.1.12. Lookup Tables - Part 3

LK ORGAN				LK R	ACE
P * NAME	VARCHAR2 (125 BYTE)	P	> >	* NAME	VARCHAR2 (50 BYTE)
LINK DATE CREATED	VARCHAR2 (2000 BYTE) DATE			DESCRIPTION LINK	VARCHAR2 (1000 BYTE) VARCHAR2 (2000 BYTE)
CREATED_BY	VARCHAR2 (20 BYTE)			DATE CREATED	DATE
DATE_LAST_UPDATED				CREATED_BY	VARCHAR2 (20 BYTE)
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)			DATE_LAST_UPDATED	
				LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
	_				
P * NAME DESCRIPTION	VARCHAR2 (40 BYTE) VARCHAR2 (1000 BYTE)		D	LK_REAGE * NAME	VARCHAR2 (50 BYTE)
LINK	VARCHAR2 (2000 BYTE)			DESCRIPTION	VARCHAR2 (1000 BYTE)
DATE_CREATED	DATE			LINK	VARCHAR2 (2000 BYTE)
CREATED_BY DATE LAST UPDATED	VARCHAR2 (20 BYTE)			DATE_CREATED CREATED BY	DATE VARCHAR2 (20 BYTE)
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)			DATE_LAST_UPDATED	
				LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
LK_PLAT					
P * NAME DESCRIPTION	VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE)			LK_RELEAS	
LINK	VARCHAR2 (1000 BYTE)	F	2	* NAME	VARCHAR2 (50 BYTE)
DATE_CREATED	DATE			DESCRIPTION DATE CREATED	VARCHAR2 (1000 BYTE) DATE
	VARCHAR2 (20 BYTE)			CREATED BY	VARCHAR2 (20 BYTE)
DATE_LAST_UPDATED LAST_UPDATED_BY	VARCHAR2 (20 BYTE)			DATE_LAST_UPDATED	DATE
				LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
LK PROTO	COL TYPE			LK RESEAR	CH FOCUS
P * NAME	VARCHAR2 (100 BYTE)	F	<b>)</b> ;	* NAME	VARCHAR2 (50 BYTE)
DESCRIPTION	VARCHAR2 (1000 BYTE)			DESCRIPTION	VARCHAR2 (1000 BYTE)
DATE CREATED	VARCHAR2 (2000 BYTE) DATE			LINK DATE CREATED	VARCHAR2 (2000 BYTE) DATE
CREATED_BY	VARCHAR2 (20 BYTE)			CREATED_BY	VARCHAR2 (20 BYTE)
DATE_LAST_UPDATED LAST_UPDATED_BY				DATE_LAST_UPDATED	
LAST_OFDATED_BT	VARCHAR2 (20 BYTE)			LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
LK PROTE		ſ		LK SAMP	
P * NAME	VARCHAR2 (255 BYTE)		P	* NAME	VARCHAR2 (50 BYTE)
* UNIPROT_ID	VARCHAR2 (50 BYTE) VARCHAR2 (255 BYTE)			DESCRIPTION	VARCHAR2 (1000 BYTE)
DESCRIPTION	VARCHAR2 (255 BTTE)				VARCHAR2 (2000 BYTE)
LINK	VARCHAR2 (2000 BYTE)			DATE_CREATED CREATED BY	DATE VARCHAR2 (20 BYTE)
DATE_CREATED CREATED BY				DATE_LAST_UPDATED	DATE
DATE LAST UPDATED	VARCHAR2 (20 BYTE) DATE			LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)	L			
				LK SOUR	CE TYPE
		F	<b>)</b>	* NAME	VARCHAR2 (30 BYTE)
P * NAME DESCRIPTION	VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE)			DESCRIPTION LINK	VARCHAR2 (1000 BYTE)
LINK	VARCHAR2 (2000 BYTE)			DATE_CREATED	VARCHAR2 (2000 BYTE) DATE
DATE_CREATED	DATE			CREATED_BY	VARCHAR2 (20 BYTE)
CREATED_BY DATE_LAST_UPDATED	VARCHAR2 (20 BYTE)			DATE_LAST_UPDATED	
LAST UPDATED BY	VARCHAR2 (20 BYTE)			LAST_UPDATED_BY * TABLE NAME	VARCHAR2 (20 BYTE) VARCHAR2 (30 BYTE)
	· · -/			INDEL_NAME	VARCHARZ (SUBILE)

	LK SP	ECIES
Ρ	* NAME	VARCHAR2 (30 BYTE)
	COMMON_NAME	VARCHAR2 (100 BYTE)
		VARCHAR2 (2000 BYTE
J	* TAXONOMY ID	VARCHAR2 (10 BYTE)
	DATE_CREATED	DATE
	CREATED BY	VARCHAR2 (20 BYTE)
		DATE
	DATE_LAST_UPDATED LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
	* TAXONOMY_ID_SUBSE	T VARCHAR2 (10 BYTE)
_		
P	* CONDITION REPORTED	ON_PREF_MAPPNG VARCHAR2 (550 BYTE)
F	* CONDITION PREFERRE	
	COMMENTS	VARCHAR2 (200 BYTE
	DATE CREATED	DATE
	CREATED BY	VARCHAR2 (20 BYTE)
	DATE LAST UPDATED	DATE
	LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
	LASI_OFDATED_BT	VARCHARZ (ZU BITE)
	LK STUDY	
P	* NAME	VARCHAR2 (50 BYTE)
٣		
	DESCRIPTION	VARCHAR2 (1000 BYTE)
		VARCHAR2 (2000 BYTE)
	DATE_CREATED	
	CREATED_BY	VARCHAR2 (20 BYTE)
	DATE_LAST_UPDATED	
	LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
		Y PANEL
P	* NAME	VARCHAR2 (100 BYTE)
٢.		VARCHAR2 (100 BTTE)
	DESCRIPTION	VARCHAR2 (1000 BYTE)
		VARCHARZ (1000 BTTE)
		VARCHAR2 (100 BVTE)
	DISPLAY_NAME	VARCHAR2 (100 BYTE)
	SORT_ORDER	NUMBER (38)
	SORT_ORDER VISIBLE	NUMBER (38) VARCHAR2 (1 BYTE)
	SORT_ORDER VISIBLE DATE_CREATED	NUMBER (38) VARCHAR2 (1 BYTE) DATE
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE)
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE)
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)
P	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE
P	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) T LOCATION VARCHAR2 (50 BYTE)
P	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY LK_SUBJECT * NAME	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) T LOCATION
P	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK_SUBJEC * NAME * DESCRIPTION	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) TLOCATION VARCHAR2 (50 BYTE) VARCHAR2 (4000 BYTE)
P	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY LK_SUBJEC * NAME * DESCRIPTION LINK DATE_CREATED	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) TLOCATION VARCHAR2 (50 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (2000 BYTE) DATE
P	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK_SUBJECT * NAME * DESCRIPTION LINK DATE_CREATED CREATED_BY	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) T LOCATION VARCHAR2 (50 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE)
Ρ	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY LK_SUBJEC * NAME * DESCRIPTION LINK DATE_CREATED	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) T LOCATION VARCHAR2 (50 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE)
P	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY <b>LK_SUBJEC</b> * NAME * DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) TLOCATION VARCHAR2 (50 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK_SUBJECT * NAME * DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK_T0	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) T LOCATION VARCHAR2 (20 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)
P	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LINK DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LAST_UPDATED_BY LK_TO * NAME	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) TLOCATION VARCHAR2 (20 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) EVENT VARCHAR2 (50 BYTE)
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED_ LAST_UPDATED_BY <b>LK_SUBJEC</b> * NAME * DESCRIPTION LINK DATE_CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY <b>LK_TO</b> * NAME * DESCRIPTION	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (300 BYTE) VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE)
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK_SUBJECT * NAME * DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK_TO * NAME * DESCRIPTION LINK	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) TLOCATION VARCHAR2 (20 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (2000 BYTE)
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY <b>LK_SUBJEC</b> * NAME * DESCRIPTION LINK DATE_CREATED_BY DATE_LAST_UPDATED_BY <b>LK_TO</b> * NAME * DESCRIPTION LINK DATE_CREATED	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) TLOCATION VARCHAR2 (20 BYTE) VARCHAR2 (50 BYTE) VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (2000 BYTE) VARCHAR2 (2000 BYTE) VARCHAR2 (2000 BYTE)
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY LK_SUBJEC * NAME * DESCRIPTION LINK DATE_CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK_TO * NAME * DESCRIPTION LINK DATE_CREATED CREATED_BY	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) TLOCATION VARCHAR2 (20 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE)
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LK_SUBJEC * NAME * DESCRIPTION LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LINK DATE_CREATED LINK DATE_CREATED CREATED_BY DATE_LAST_UPDATED	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (300 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (200 BYTE) VARCHAR2 (20 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (2000 BYTE) VARCHAR2 (2000 BYTE) VARCHAR2 (2000 BYTE) VARCHAR2 (2000 BYTE) DATE VARCHAR2 (20 BYTE) VARCHAR2 (20 BYTE) DATE
	SORT_ORDER VISIBLE DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY LK_SUBJEC * NAME * DESCRIPTION LINK DATE_CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY LK_TO * NAME * DESCRIPTION LINK DATE_CREATED CREATED_BY	NUMBER (38) VARCHAR2 (1 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE) TLOCATION VARCHAR2 (20 BYTE) VARCHAR2 (4000 BYTE) VARCHAR2 (200 BYTE) DATE VARCHAR2 (20 BYTE) EVENT VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (200 BYTE) VARCHAR2 (20 BYTE)

#### 3.3.1.13. Lookup Tables - Part 4

LK_TEMPLA	TE_MAPPING
P * TEMPLATE_NAME	VARCHAR2 (100 BYTE)
P * FILE_TYPE P * FILE_NAME	VARCHAR2 (30 BYTE)
P * FILE NAME	VARCHAR2 (250 BYTE)
COMMENTS	VARCHAR2 (250 BYTE)
DESCRIPTION	VARCHAR2 (1000 BYTE)
F FILE DETAIL	VARCHAR2 (100 BYTE)
LINK	VARCHAR2 (2000 BYTE)
F RESULT SCHEMA	VARCHAR2 (50 BYTE)
TEMPLATE TYPE	VARCHAR2 (30 BYTE)
DATE CREATED	DATE
CREATED BY	VARCHAR2 (20 BYTE)
DATE LAST UPDATED	
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
BAGI_GI BATEB_BI	
LK TIN	IE UNIT
P * NAME	VARCHAR2 (25 BYTE)
* DESCRIPTION	VARCHAR2 (1000 BYTE)
LINK	VARCHAR2 (2000 BYTE)
DATE CREATED	DATE
CREATED BY	VARCHAR2 (20 BYTE)
DATE LAST UPDATED	
LAST UPDATED BY	VARCHAR2 (20 BYTE)
	VARCHARZ (20 BTTE)
	F MEASURE
P * NAME	VARCHAR2 (50 BYTE)
	VARCHAR2 (50 BTTE)
DESCRIPTION	
LINK * TYPE	VARCHAR2 (2000 BYTE)
DATE CREATED	VARCHAR2 (50 BYTE)
	DATE VARCHAR2 (20 BYTE)
CREATED_BY DATE LAST UPDATED	
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
	CRIPT_TYPE
P * NAME	VARCHAR2 (50 BYTE)
DESCRIPTION	VARCHAR2 (1000 BYTE)
LINK	VARCHAR2 (2000 BYTE)
DATE_CREATED	DATE
CREATED BY	VARCHAR2 (20 BYTE)
DATE_LAST_UPDATED	

_					
	LK_UPL	DAD_METHOD		LK VISIBILITY	CATEGORY
P	* NAME DESCRIPTION DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)	Ρ	DESCRIPTION DATE_CREATED CREATED_BY DATE_LAST_UPDATED	VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)
			F		
		OAD_STATUS	_		-
F	* NAME DESCRIPTION DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)	P	* NAME DESCRIPTION DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	VARCHAR2 (50 BYTE) VARCHAR2 (1000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)
	LK_US	ER_ROLE_TYPE		LK WORKS	PACE TYPE
F	* NAME DESCRIPTION DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	VĀRCHARZ (2 BYTE) VARCHAR2 (1000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)		P * NAME * DESCRIPTION DATE_CREATED CREATED_BY DATE_LAST_UPDATED LAST_UPDATED_BY	VARCHAR2 (20 BYTE) VARCHAR2 (1000 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)
	LK_V	IRUS_STRAIN			
F	* NAME CENTER_ID_NAME_SE, DESCRIPTION LINK SEASON_LIST * TAXONOMY ID VIRUS_NAME DATE_CREATED CREATED_BY DATE_LAST_UPDATED_BY LAST_UPDATED_BY	VARCHAR2 (200 BYTE) VARCHAR2 (500 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (1000 BYTE) VARCHAR2 (2000 BYTE) NUMBER (38) VARCHAR2 (10 BYTE) DATE VARCHAR2 (20 BYTE) DATE VARCHAR2 (20 BYTE)			

## 3.3.1.14. Upload Registration

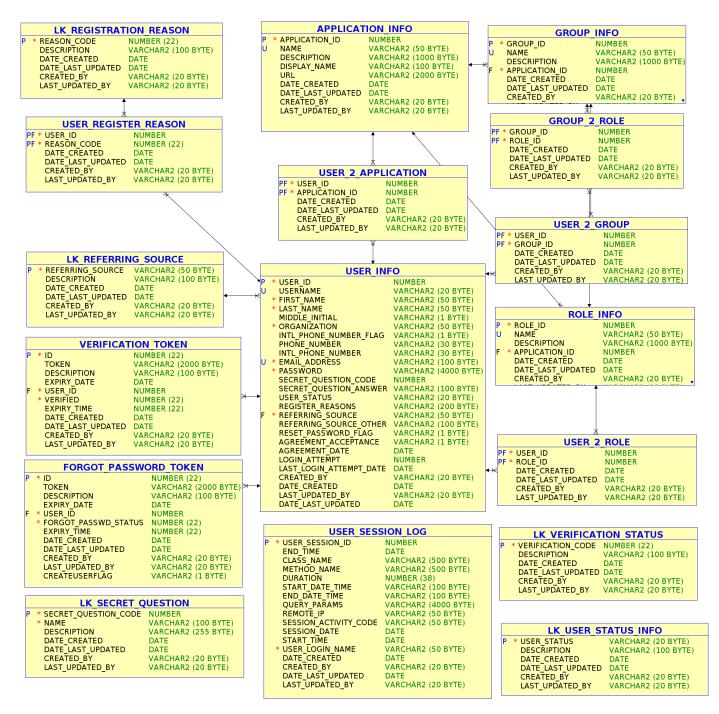
UPLOAD_REGIS	STRATION		UPLOAD REGISTRATIO	ON RESULT
P * UPLOAD_REGISTRATION_ID	NUMBER (38)		P * UPLOAD_REGISTRATION_RESULT_ID	NUMBER (38)
DELETE_FLAG	VARCHAR2 (1 BYTE)		DESCRIPTION	VARCHAR2 (4000 BYTE)
FILE_NAME	VARCHAR2 (200 BYTE)		ERROR_MESSAGE	VARCHAR2 (4000 BYTE)
FILE_SIZE	VARCHAR2 (50 BYTE)		FILE_NAME	VARCHAR2 (4000 BYTE)
NOTE	VARCHAR2 (4000 BYTE)		LINE_NUMBER	NUMBER (38)
* STATUS	VARCHAR2 (50 BYTE)		STATUS	VARCHAR2 (50 BYTE)
SUBMISSION_REPORT	CLOB	<k< th=""><th>F UPLOAD_REGISTRATION_ID</th><th>NUMBER (38)</th></k<>	F UPLOAD_REGISTRATION_ID	NUMBER (38)
UPLOAD_METHOD	VARCHAR2 (20 BYTE)		* UPLOAD_TICKET_NUMBER	VARCHAR2 (100 BYTE)
* UPLOAD_TICKET_NUMBER	VARCHAR2 (100 BYTE)		DATE_CREATED	DATE
USERNAME	VARCHAR2 (20 BYTE)		CREATED_BY	VARCHAR2 (20 BYTE)
F * WORKSPACE_ID	NUMBER (38)		DATE_LAST_UPDATED	DATE
DATE_CREATED	DATE		LAST_UPDATED_BY	VARCHAR2 (20 BYTE)
CREATED_BY	VARCHAR2 (20 BYTE)			
DATE_LAST_UPDATED	DATE			
LAST_UPDATED_BY	VARCHAR2 (20 BYTE)	'		

### 3.3.1.15. Curation

	CURATION QUERY				
Ρ	* CURATION QUERY ID	NUMBER (10)			
	QUERY_DESCRIPTION	VARCHAR2 (4000 BYTE)			
	* QUERY_NAME	VARCHAR2 (1000 BYTE)			
QUERY PARAMETERS		VARCHAR2 (4000 BYTE)			
	QUERY_SQL	CLOB			
	DATE_CREATED	DATE			
	CREATED BY	VARCHAR2 (45 BYTE)			
	DATE LAST UPDATED	DATE			
	LAST UPDATED BY	VARCHAR2 (45 BYTE)			

CURATION QUERY RESULTS					
P * CURATION_QUERY_RESULTS_ID	NUMBER (10)				
CURATION_PARAMETER_VALUES	VARCHAR2 (4000 BYTE)				
* CURATION_QUERY_NAME	VARCHAR2 (1000 BYTE)				
CURATION_QUERY_RESULTS_NAME	VARCHAR2 (1000 BYTE)				
ERROR_MESSAGE	VARCHAR2 (4000 BYTE)				
MODIFIED_DATE	DATE				
* RESULT_STATUS	VARCHAR2 (30 BYTE)				
RESULTS_FILE	CLOB				
DATE_CREATED	DATE				
CREATED_BY	VARCHAR2 (45 BYTE)				
DATE LAST UPDATED	DATE				
LAST UPDATED BY	VARCHAR2 (45 BYTE)				

### 3.3.1.16. BISC Security



# 3.4. Aspera Server

We integrated technology from Aspera, an IBM company, into the ImmPort system architecture. The Aspera Connect Server using the patented FASP® technology allows for optimized data transfer speeds across the Internet; we have utilized this technology for data submission and data downloads for large files.

The Aspera security infrastructure provides user authentication and permissions on file systems. A free Aspera Connect Client provides a plug-in for users to install locally to take advantage of the FASP® UDP

based transfer optimization. The Aspera SDK is utilized currently for accessing the Aspera Connect Server from the ImmPort application and data submission servers to queue up transfer tasks and return results to users.

More detailed documentation regarding the Aspera Connect Server, the Aspera SDK, FASP® technology, and the Aspera Connect Client can be found online at <u>www.ibm.com/products/aspera</u>.

# **3.5. HOSTED APPLICATIONS**

## 3.5.1. ImmPort Core Query API

The Core Query API provides programmatic access to Core ImmPort Data. This API works as a SQL query tool to access data in the relational database (Oracle). The API returns a tab delimited output by default. The Core Query API endpoints can be accessed directly by a user or by an application. All requests to the Core Query API require authentication and the Core Query API uses tokens for authentication. Users obtain tokens by posting to the ImmPort Authentication URL <a href="https://auth.immport.org/auth/token">https://auth.immport.org/auth/token</a> with a username and password. They must include the authentication token as an Authorization: bearer in the custom HTTP header.

### 3.5.1.1. Feature Summary

The primary function of the core query api as currently developed is to assist curators in executing and saving database SQL queries that help with daily operational tasks in getting data collected, QC'ed, shared and curated. Based on usefulness to the internal curation team, it can be evaluated over time if the application would also be useful for external users.

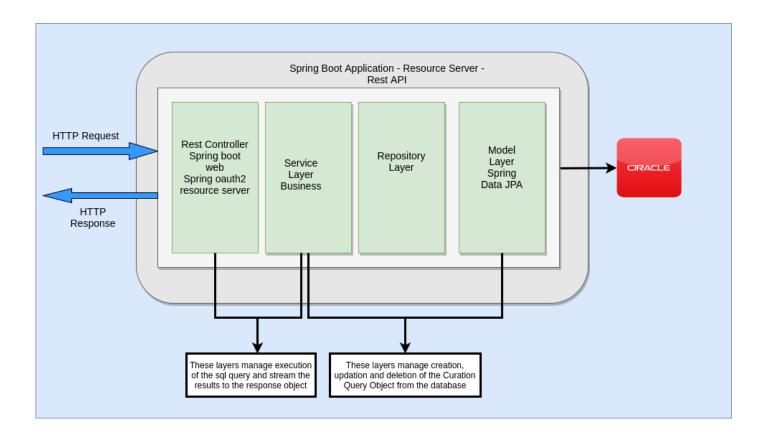
The endpoints of the API are listed below

HTTP URL	Parameters (pass in the body of the request)	Description	GET/POST
/query/delete/{queryID}		Deletes the query with the specified query id stored in the database	GET
/query/id/{queryId}		Get backs the query object in json format	GET
/query/all		Gets all the query objects	GET
/query/username/{username		Gets all the query objects for the specified username	GET
/query/add	JSON Query Object Example : { "queryName": "Study query", "queryDescription": "study query", "querySql": "select * from study where study_accession = '{study_accession}''' }	Adding a query object to be stored in the database	POST
query/update	JSON Query Object	Updating query object in the database. The json object passed in	POST

	Example : {     "curationQueryId": 1150,     "querySql": "select * from study" }	the object should have a curationQueryId	
/query/execute/{queryId}	Example : Url : /query/execute//1198 Parameters: { "study_accession":"SDY1" }	Executes the sql query stored in the database for the specified query id with the parameters passed	POST
query/executeSql	Example: { "querySql": "select * from study where study_accession = 'SDY2''' }	Executes the sql query passed as a parameter	POST

#### 3.5.1.2. ImmPort Core Query API Software Architecture

The purpose of this API is to execute SQL queries dynamically and return tab delimited results back. The execute endpoint is called with a query id, the parameterized query is retrieved from the database and the parameters values passed in the POST body are replaced in the query string. The executeSql endpoint has the SQL query that needs to be executed in the body of the POST. The response to both endpoints are tab delimited results. The return columns specified in the query can be of different types and column type is determined by the ResultSetMetaData from the resultset when the query is executed. The fetch size is set to one so the results can be streamed to the response without an overhead on the memory on the server where the application is running.



## 3.5.2. Data Submission

The ImmPort data collection and sharing process is the product of extensive interaction, discussion, prototyping, and refinement with the DAIT POs, data providers and researchers who use the shared data. In order to encourage standardization of terms and vocabulary the ImmPort team developed a set of templates to capture, name, and define key elements of biomedical research data. The templates are informed by community standards where available. The ImmPort team engages with data standards communities such as the HIPC Standards Working Group, ISA Tools, CDISC, the minimal information standard groups, CEDAR, the Antibody Registry, and ontology developers to explore how to enhance the description of data captured in the templates. Templates are provided in a Microsoft Excel version to provide inline comments, validation, and ease-of-use features such as dropdown lists and color-coding of related data fields. The operational version of the templates is a simple tab separated value format that is widely used in bioinformatics.

Each template is fully documented consistent with the requirements of NIAID and the research community. Explanations include the purpose of the template, structure of the template (e.g. section, column, and row names), elements of the template required, whether numeric, preferred vocabulary or free text should be entered into a data field, how data elements are linked to each other across templates, and a glossary of terms and their reference sources. All templates, reference guides and example completed templates are version controlled and published when a software release is deployed. Detailed information on data submission and templates are available at

<u>https://www.immport.org/resources/dataTemplates</u>. Online interactive information for the templates is available at <u>https://www.immport.org/shared/templateDocumentation</u>.

#### 3.5.2.1. Validation

A Batch Upload consists of a single Template file or group of Template file(s) and zero or more data file(s) provided in a zip-file or folder. Data files are either required by the template file(s) or designated as archive file(s). A Template file is a self formatted file consisting of a header segment, column specification and data column rows. Batch upload validation consists of validating all data in the set of templates and associated file before any data is uploaded into Oracle database and ImmPort file system. If any data in a Batch Upload fails validation no data is uploaded into Oracle database or file loaded into ImmPort file system by the the batch uploader. The set of all possible ImmPort templates have a specific validation and upload order. That is, data in one template must be loaded into the Oracle database prior to another template being uploaded since data in a latter template can depend upon data in a former template. All data within a Batch Upload must be valid to be uploaded into the Oracle database and ImmPort file system. Data in each template is uploaded into one or more Oracle database tables and files associated with the template are uploaded into the ImmPort file system. The data in a Batch Upload is valid if all the foreign keys for the set of Oracle tables to be loaded are satisfied and no duplicate rows are to be loaded into the set of Oracle database tables. Data columns within a template are mapped to one or more Oracle database table(s) columns. Several of these table columns are required to satisfy a controlled vocabulary. That is, the table column has a foreign key constraint to a Oracle database (lookup) controlled vocabulary. The Oracle tables have other foreign key constraints defined between the Oracle tables that provide parent-child relationships among the tables (for example, experiment accession in EXPSAMPLE is related to experiment accession in experiment).

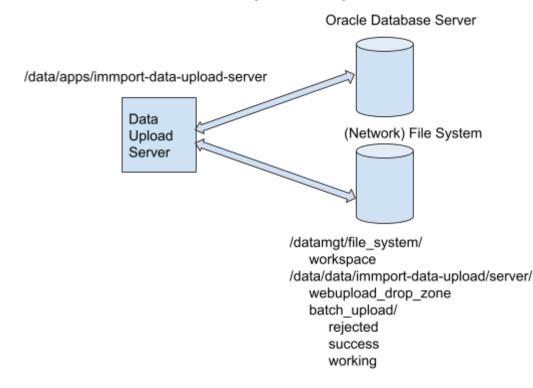
Validation requirements for each template are specified declaratively in XML. The XML specification provides the following: declaration of row uniqueness, the specification of generation of unique ID's for table rows, parent-child foreign key requirements, rules that must be satisfied on the template columns to be valid for upload, processes to process template columns into database columns and make further checks, and controlled vocabulary checks. The XML also specifies the mapping of template columns to database table(s) columns, and the specific validation queries that support parent-child foreign key requirements. The XML specification is currently implemented in the Batch Uploader Java software system.

A validation service, where no data is uploaded into the Oracle database or files are uploaded into ImmPort file system, is provided through the Data Manager and Batch Upload API. The Data Manager uses Batch Upload API to perform the validation.

#### 3.5.2.2. Submission

Data Upload Submission is provided through the Data Manager and the Batch Uploader API. A Batch Upload Submission submits the file or folder to the upload zone and registers the upload job as pending in the Oracle database. The Batch Upload back-end server performs the validation as specified above and, if the upload is valid, it loads the data into the Oracle database and associated file(s) into ImmPort file system. The back-end Batch Upload server processes uploads through a cyclic basic (cron job). The submission process wakes every five (5) minutes and processes all pending Batch Uploads in submission timestamp order. This allows upload submissions to depend on one another.

The software architecture of the Batch Uploader server provided below.



### 3.5.3. Data Batch Update

The Data Batch Updater provides the mechanism for updating Oracle database tables (update, delete, and insert special linkages) after they have been uploaded by the Batch Uploader. The Data Batch Updater also allows for management of controlled vocabulary (lookup) tables (insert, update, and delete). A Data Batch Updater upload consists of a single formatted text-file that specifies an operation on a single Oracle database table that will perform either updates, insertions, or deletions. As with the Batch Uploader the operations on the Oracle database tables are specified declaratively in XML and implemented in the Data Batch Updater Java software system. The Batch Updater does not affect columns in the Oracle database that specify path information for associated files residing in the ImmPort file system. Also, the batch updater does not delete any row in an Oracle database table that contains ImmPort file system path information (See File System Management Update).

#### 3.5.3.1. Validation

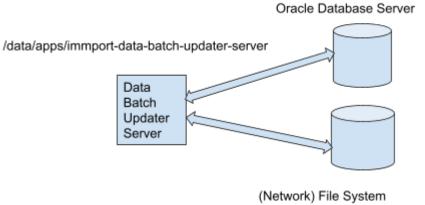
As with the Batch Uploader, the Batch Updater performs a validation phase on the batch updater file. These validations include: check duplicate rows by primary key or unique indices, check required columns, check foreign keys on columns of rows being inserted or updated, and in the case of deletion that there are no foreign key linkages involving the row being deleted with other Oracle database tables. If all validations are successful the updater file is uploadable. A validation service, where no data is uploaded or modified in the Oracle database, is provided through the Data Manager and Batch Updater API. The Data Manager uses Batch Updater API to perform the validation.

#### 3.5.3.2. Submission

Batch Updater Submission is provided through the Data Manager or the Batch Updater API. The submission includes putting the updater file into the upload zone and registering a pending Batch Updater job in the Oracle database. A Data Batch Updater upload back-end server processes the pending Batch Updater jobs. The server validates the updater job and, if validated, processes it into an Oracle database. The back-end Batch Updater server manages batch

update jobs through a cyclic (cron) process. The server wakes every five (5) minutes and processes all the pending updater jobs in submission timestamp order. This allows updater submissions to depend on one another.

The software architecture of the Batch Updater server provided below.





## 3.5.4. File System Management Update

The File System Management Update Application manages updates to the Oracle database and ImmPort file system, keeping the two consistent between each other. The File System Management Update Application performs the following operations each identified as a single File System Management Update submission:

#### **Remove Workspace**

Remove Workspace operation removes the current content of Oracle database and the associated files in the ImmPort file system specific to the workspace and leaves the workspace empty to be operated on again. An option allows the workspace to be removed completely from the Oracle database and ImmPort file system. In the latter case the workspace no longer exists in the ImmPort file system.

#### Remove Upload Ticket Number

Remove Upload Ticket Number removes all Oracle database table content and associated files in the ImmPort file system related to the upload ticket. Only the recent completed upload ticket for a given workspace can be removed, after which is it marked as deleted.

#### **Remove Study**

Remove Study removes all the Oracle database table content and associated files in ImmPort file system related to a given study.

#### **Remove File**

For a given data file stored in the ImmPort file system (file info file (FILE\_INFO.FILE\_INFO\_ID), protocol file (PROTOCOL\_PROTOCOL\_ACCESSION), study file (STUDY\_FILE.STUDY\_FILE\_ACCESSION), or study image file (STUDY\_IMAGE.SCHEMATIC\_ACCESSION)), the file is removed from the ImmPort file system, and all linkages to the file in Oracle database for file info and protocol files. Finally, the row in the associated table is removed.

#### **Remove Multiple Files**

Remove multiple files requires a file comprising one line per ImmPort file system file to remove. Each line is comprised of file ID: file\_info\_id (FILE\_INFO), protocol\_accesion (PROTOCOL), study\_file\_accession (STUDY\_FILE), or schematic\_accession (STUDY\_IMAGE). All files must reside in the same workspace. The operation performs Remove File for each file ID.

#### **Move Archive Files**

For files that are designated as archived and stored in FILE\_INFO (file detail ::= Archived) can be moved to a result file designation within a workspace. That is, the file can be associated with ASSESSMENT\_PANEL (ASSESSMENT\_2\_FILE\_INFO), EXPSAMPLE (EXPSAMPLE\_2\_FILE\_INFO), CONTROL\_SAMPLE (CONTROL\_SAMPLE\_2\_FILE\_INFO), or STANDARD\_CURVE (STANDARD\_CURVE\_2\_FILE\_INFO). This operation requires a tab-separated file as input that contains one or more line with the format: (FILE\_INFO\_ID, ACCESSION, FILE\_DETAIL). The FILE\_DETAIL comes from the LK\_FILE\_DETAIL controlled vocabulary table. If a given FILE\_INFO\_ID repeats in the file, then the set of ACCESSION sassociated with it must belong to the same study, and the associated FILE\_DETAIL must be the same. The ACCESSION must satisfy the accession format for the following accessions respectively: ASSESSMENT\_PANEL\_ACCESSION, EXPSAMPLE\_ACCESSION, CONTROL\_SAMPLE\_ACCESSION, or STANDARD\_CURVE\_ACCESSION.

#### **Transfer Files**

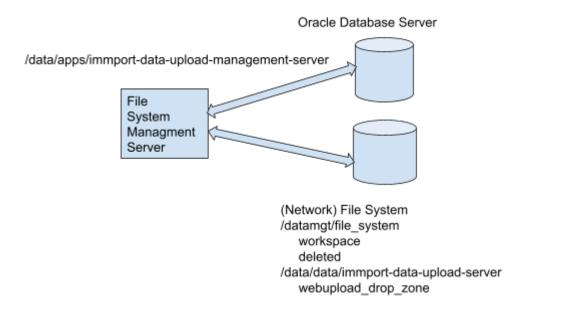
The (result) files can be transferred from one study to another within a workspace. The operation takes a tab-separated file where each line has the format: (FILE\_ID, STUDY\_ACCESSION). The FILE\_ID can be one of the following FILE\_INFO\_ID (FILE\_INFO), STUDY\_FILE\_ACCESSION (STUDY\_FILE), or STUDY\_IMAGE (SCHEMATIC\_ACCESSION). The STUDY\_ACCESSION must differ from the study to which the FILE\_ID is currently associated.

#### Assign CRF Files

This operation transfers study-based file system files in STUDY\_FILE and assigns them as a CRF-file to an assessment panel in ASSESSMENT\_2\_FILE\_INFO within the same study. That is, both the study file and assessment panel are in the same study. The operation requires a tab-separated file with the following format: (STUDY\_FILE\_ACCESSION, ASSESSMENT\_PANEL\_ACCESSION). All studies must reside within the same workspace.

File System Management Update validates a given operation. Validation includes determining the existence of the object(s) to be operated upon and the specific requirements of the operation. The File System Management Update submission is accessed through the Data Manager that defines the above operations as a single submission. The pending operation is stored in a scheduling table in the Oracle database and any associated file for the operation in the upload zone. The back-end File System Management Update server is a cron process that wakes every five (5) minutes and processes all the pending File System Management Update jobs in submission timestamp order. This allows operation submissions to depend on one another.

The software architecture of the File System Management Server is provided below



### 3.5.5. Data Manager

The Data Management Server hosts the web application that provides users with the interfaces to submit, query, and edit private research and clinical data to which they have access via a private workspace.

### 3.5.6. Sharing Tool

The Sharing tool hosts a web application designed to share study data from private workspaces to a collaborative workspace and then to a public workspace. This tool is used during the study data release process. When a set of studies is ready to be publicly shared or re-shared the following process is followed in the sharing tool. A collaborative workspace is created by clicking on the Create Collaborative workspace menu.

Create a New Collaborative Project	
Fields marked with an asterisk * are required.	DR38 Release
Category*:	Test Contract or Grant: can be used for any testing purpose
Project Owner*:	testadmin
	Save Reset

The study to be shared is first shared to the newly created Collaborative workspace by clicking on the Share Study button. Before you click the button you will get a report on the details of the study data that are to be shared. If the study is being re-shared the Shared Count column will have non-zero counts indicating how many experiments or lab tests or other study data have already been shared.

Select a Collaborative Workspace:	DR38 Release   Get Report Pre-Check Reset		
ext to the Study Entity Name	indicates that this entity is shared.	<ul> <li>✓ Count</li> </ul>	<ul> <li>Shared Count (to SPW)</li> </ul>
<ul> <li>Study Entry Name</li> <li>Study*</li> </ul>		1	
<ul> <li>✓ Subject*</li> </ul>		69	0
Experiment*		1	0
<ul> <li>Experimental Sample*</li> </ul>		56	0
Bio Sample*		26	0
Control Sample*		0	0
Standard Curve*		0	0
<ul> <li>Lab Test</li> </ul>		0	0
✓ Lab Test Panel*		0	0
<ul> <li>Reagent*</li> </ul>		2	0
Study File		0	0
Treatment*		1	0
✓ Protocol*		1	0
✓ File Info*		56	0
<ul> <li>Assessment Panel*</li> </ul>		0	0

The Pre-Check button can be clicked to do some validations on the study data being shared.

Share Study To Collaborative Workspace			
Study Accession Number:	SDY10		
Select a Collaborative Workspace:	DR38 Release 🗸		
	Get Report Pre-Check Reset		
All the Bio Samples are associated to P	All the Bio Samples are associated to Planned Visit		
All the Subjects are associated to Bio Si	All the Subjects are associated to Bio Samples		
All the Experimental Samples are assoc	All the Experimental Samples are associated to Reagents		
All the Experimental Samples are assoc	All the Experimental Samples are associated to Treatments		

Once the study data is shared to the Collaborative workspace, it can be shared to the Public workspace

Share Study To Semi-Public Workspace					
Study Accession Number:	SDY10				
	Get Collaborative Projects For Study Reset				
Select a Collaborative Workspace:	DR38 Release				
Planned Public Release Date:	02/26/2021				
Data Release Version:	DR38				
Data Release Date:	02/26/2021				
	Share Collaborative Project to SPW				

All study data shared to the public workspace is exported to the Aurora MySQL database on AWS.

### 3.5.7. User Administration

The User Administration Server hosts the web application designed to manage user registrations, accounts, and project access. The Manage User design artifacts model system administration capabilities which include allowing users to request system access (register), creating user accounts, updating user information, querying users, assigning groups and roles to users and deactivating users from the system. The User Administration Application is a Spring boot application with its frontend coded in AngularJS.

#### 3.5.7.1. Registering User

A user can register to gain access to ImmPort applications. By default the user is assigned the role "ROLE\_USER". One of the access rights this role gives the user is access to the data browser application to download studies. The individual initiates a registration request upon which the user sees the Notice

**Register User: Notice** 

H

Access to ImmPort research and clinical data is available to any user after a brief registration and approval process. You will be asked to accept a data sharing and access agreement before you will be allowed to login to the ImmPort system. If you choose to submit your own data either for eventual sharing or for use of analysis tools, your data will be kept in a confidential private workspace until you choose otherwise. If you have any questions about access or the registration process, contact ImmPort Helpdesk@immport.org.



The system displays a page to gather information about the user. The username and email address are unique to the system so the user cannot add a username or email address that already exists in the system. The system validates the user information and saves the registration request, provided the data submitted are valid. Appropriate error messages are displayed if errors are encountered.

Long and I		Dest	- 4 43	
Imm	Port	Regi	strat	Ion

Username*: [rules]	johndoe1		
Name*:	john	Middle Initial (Optional)	doe
Email*:	johndoe@gmail.com	Organization*:	Stanford University
Password*: [rules]		Confirm Password*:	••••••
Password Retrieval	Show password  What is your favorite color?	Password Retrieval	blue
Question*:		Answer*:	bite
Phone Number: [XXX-XXX-XXXX]	240-879-4563	International Phone Number:	
How may ImmPort assist your research efforts?*:	2 selected -	How did you learn of ImmPort?*:	Colleague
Other ways ImmPort may assist your	I am using it for testing		
research efforts?*:			
You will be able to access:	Shared Research Data Analysis Tools		
	Register Reset		

An email is sent to the user to confirm the email address provided. This email contains a link the user needs to click to activate the account.

Registration Confirmation Inbox ×	
ImmPort_Helpdesk@immport.org	12:41 PM (32 minutes ago)
Dear March Dimes,	
Thank you for registering with ImmPort. An account was created for you. Please click on the link below to activate your account <u>Click here to confirm your registration</u>	ıt.

This is an automated message. Please do not reply to this email, but contact BISC\_HELPDESK@mail.nih.gov if you have any questions.

### 3.5.7.2. Creating an User by an Administrator

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The ImmPort Administrator can create a user and assign appropriate access roles. The admin fills in the appropriate user information and clicks Create User

#### **Create New User For ImmPort**

Username*: [rules]	johndoe		
Name*:	john	R	doe
Email*:	johndoe@gmail.com	Organization*:	Stanford
Phone Number: [XXX-XXX-XXXX]	240-550-2279	International Phone Number:	International Phone Number
How may ImmPort assist your research efforts?*:	1 selected -	How did you learn of ImmPort?*:	NIH Staff 🗸 🗸
Other ways ImmPort may assist your research efforts?*:	I am using it for testing		
Would like Access to:			
	Z DATA BROWSER		
	CURATION APPLICATION		
	□ SHARING APPLICATION		
[XXX-XXX]       Z40-550-2279       Number:       International Phote Number         How may ImmPort assist your research efforts?*:       1 selected •       How did you learn of ImmPort?*:       NIH Staff         Other ways ImmPort may assist your research efforts?*:       I am using it for testing       I am using it for testing         Would like Access to:       I MMPORT DATA MANAGEMENT       I DATA BROWSER       USER ADMINISTRATION         I USER ADMINISTRATION       CURATION APPLICATION       SHARING APPLICATION         ImmPort Authentication and Authorization Server       ImmPort Authentication and Authorization Server			
	✓ ImmPort Data API		
	ImmPort RESTful Web Services		
	ImmPort User Service		
	Create User Reset		

A user account is created and an email is sent to the user's email address to set his password. When the user sets his password, his account is activated.

#### **Create New User For ImmPort**

A user account is created with the following information. A message will be sent to the user on the email account to set his password on the account.

Username     johndoe       First Name     johndoe       Middle Initial     R       Last Name     doe       User Status     passwordExpired		
First NamejoinMidde InitialRLast NamedoeUser StatusPassordExpiredOrganizationStanfordPhone Number240-550-2279Iternational Phone NumberIternational Phone Number	User ID	11907
Niddle InitialRLast NamedoeUser StatusRaswordExpiredOrganizationSasfordPhone Number240-550-2279Iternational Phone NumberHome Number	Username	johndoe
Last Name     doe       User Status     PasswordExpired       Organization     Stanford       Phone Number     240-550-2279       Iterrational Phone Number     Stanford	First Name	john
User Status     PasswordExpired       Organization     Stanford       Phone Number     240-550-2279       International Phone Number     Ford Content of the provide of the	Middle Initial	R
organization     Stanford       Phone Number     240-550-2279       International Phone Number     Enternational Phone Number	Last Name	doe
Phone Number     240-550-2279       International Phone Number	User Status	PasswordExpired
International Phone Number	Organization	Stanford
	Phone Number	240-550-2279
Email johndoe@gmail.com	International Phone Number	
	Email	johndoe@gmail.com
How may ImmPort assist your research efforts?  • Other Reason	How may ImmPort assist your research efforts?	Other Reason
Other ways ImmPort may assist your research efforts? I am using it for testing	Other ways ImmPort may assist your research efforts?	I am using it for testing
How did you learn of ImmPort NIH Staff	How did you learn of ImmPort	NIH Staff
List of applications requested access for DATA BROWSER, ImmPort Data API	List of applications requested access for	DATA BROWSER, ImmPort Data API

Continue to assign roles to the user

The admin can continue to assign roles to the user. Since the admin selected Data Browser and Data API while creating the user a normal user role is assigned for these applications.

#### 3.5.7.3. Search User

A user can be searched by the username, first name, last name and email address. A user once found, can be deactivated and his password can be reset. The admin can click on the Reset Password button and email will be sent to the user's email to reset his password.

#### 3.5.7.4. Applications/Groups/Roles

A group is a means of organizing users whereas a role is usually a means of organising rights. Each role assigns some access rights for an application. Roles are assigned to groups and groups are assigned to applications. For example the User Service Rest API application has two roles REST\_ADMIN and REST\_USER. REST\_ADMIN is assigned to the REST\_ADMINS group and REST\_USER is assigned to REST\_USERS group. If a user mod2021 needs access to the User Service Rest API application as an admin the REST\_ADMIN role needs to be assigned to the user. The user will need to be associated with the Application REST and to the group REST\_ADMINS. This will give the user mod2021 access to the REST\_ADMIN role.

#### Applications/Groups the user has access to:

Application Name		Group Names
DATA_BROWSER		
DATA-API		
REST		REST_USERS, REST_ADMINS
Edit Application Access	Edit Group Access	

### 3.5.8. APIs

The Batch Uploader and Batch Updater APIs provide programmatic access to the operational capabilities of the Batch Uploader and Batch Updater. The API endpoints can be accessed directly by a user or by an application (for example, Data Manager). All requests to these APIs require authentication. The Core APIs use tokens for authentication. Users can obtain tokens by posting to the ImmPort Authentication URL- https://auth.immport.org/auth/token with a username and password. They must include the authentication token as an Authorization: bearer in the custom HTTP header.

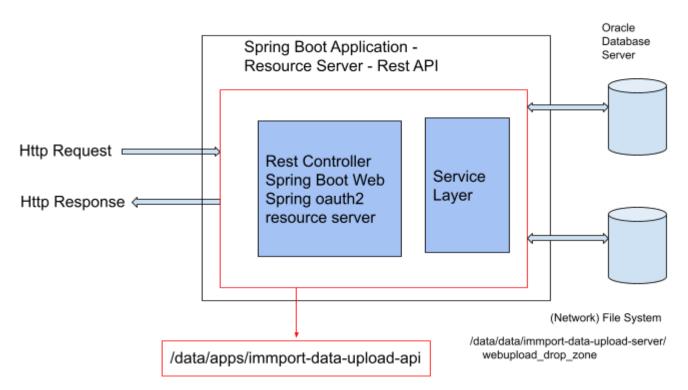
#### 3.5.8.1. Batch Uploader API

The endpoints of the Batch Uploader API are listed below.

HTTP URL	Parameters (pass in the body of the request)	Description	GET/ POST
/data/upload/documentation/tem plates/WORKSPACE_ID		Documentation Generation: Generate documentation templates for a specific workspace (WORKSPACE_ID)	GET
/data/upload/type/offline	-F "workspaceId=WORKSPACE_ID" -F "packageName=PACKAGE_NAME" -F "uploadNotes=UPLOAD_NOTES" -F "uploadPurpose=uploadData" -F "serverName=SERVER_NAME"	OffLine File(s) Upload: Request for an off-line upload; creates upload registration in preparation for receipt of the file	POST
/data/upload/type/online	-F "workspaceId=WORKSPACE_ID" -F "packageName= -F "uploadNotes=UPLOAD_NOTES" -F "uploadPurpose=uploadData" -F "serverName=SERVER_NAME -F "file=@UPLOAD_ZIP_FILE_PATH_ON_CLIENT"	Zip-File Upload: Request upload of a zip-file; transfers file and creates upload registration and performs upload	POST
/data/upload/type/online	-F "workspaceId=WORKSPACE_ID" -F "packageName=" -F "uploadNotes=UPLOAD_NOTES" -F "uploadPurpose=uploadData" -F "serverName=SERVER_NAME" -F "file=@UPLOAD_ZIP_FILE_PATH_ON_CLIENT"	Zip-File Upload: Request upload of a zip-file; transfers file and creates upload registration and performs upload	POST
/data/upload/type/online	-F "workspaceId=WORKSPACE_ID" -F "packageName=PACKAGE_NAME" -F "uploadNotes=UPLOAD_NOTES" -F "uploadPurpose=uploadData" -F "serverName=SERVER_NAME -F "file=@UPLOAD_FILE_PATH_ON_CLIENT"	Multiple Files Upload (Single File): Request upload of a single file; transfers file and creates upload registration and performs upload; Note that single file is specified with the following -F parameter, -F "file=@UPLOAD_FILE_PATH_ON_CLIENT"	POST
/data/upload/type/online	-F "workspaceId=WORKSPACE_ID" -F "packageName=PACKAGE_NAME" -F "uploadNotes=UPLOAD_NOTES"	Multiple Files Upload (Multiple Files): Request upload of a several files; transfers files and creates upload registration and performs upload;	POST

	i	i	
	-F "uploadPurpose=uploadData" -F "serverName=SERVER_NAME" -F "file=@UPLOAD_FILE1_PATH_ON_CLIENT" -F "file=@UPLOAD_FILE_PATH_ON_CLIENT 	Note that each file is specified with the following -F parameter, -F "file=@UPLOAD_FILE_PATH_ON_CLIENT"	
/data/upload/type/online	-F "workspaceId=WORKSPACE_ID" -F "packageName=" -F "uploadNotes=UPLOAD_NOTES" -F "uploadPurpose=uploadData" -F "serverName=SERVER_NAME -F "file=@UPLOAD_ZIP_FILE_PATH_ON_CLIENT"	Zip-file Upload for Validation: Zip-file validation is a two step process where the zip-file is uploaded to the server and the upload registration generated and then the validation is requested (see Validation of a File)	POST
/data/upload/type/online	-F "workspaceId=WORKSPACE_ID" -F "packageName=PACKAGE_NAME" -F "uploadNotes=UPLOAD_NOTES" -F "uploadPurpose=validateData -F "serverName=SERVER_NAME" -F "file=@UPLOAD_FILE1_PATH_ON_CLIENT -F "file=@UPLOAD_FILE_PATH_ON_CLIENT" 	Multiple File Upload for Validation (Multiple Files): Request upload of several files not as a zip-file package; Note that each file is specified with the following -F parameter, -F "file=@UPLOAD_FILE_PATH_ON_CLIENT"	POST
/data/upload/validation	-F "uploadTicketNumber=UPLOAD_TICKET_NUMBER"	Validation of Upload Ticket: Validation of job that is identified by the upload ticket number; Note this endpoint uses the -F parameter, -F "uploadTicketNumber=UPLOAD_TICKET_NU MBER"	POST
/data/upload/registration/UPLO AD_TICKET_NUMBER/status		Status of Upload Ticket: Return the current status of an upload ticket (UPLOAD_TICKET_NUMBER)	GET
/data/upload/registration/UPLO AD_TICKET_NUMBER/report s/summary		Summary Information on Upload Ticket: On completed jobs (either Completed or Rejected), provide the information on the upload ticket (UPLOAD_TICKET_NUMBER)	GET
/data/upload/registration/UPLO AD_TICKET_NUMBER/report s/database		Database Information on Upload Ticket: On completed jobs (Completed only) provide database information (UPLOAD_TICKET_NUMBER)	GET
/data/upload/registration/UPLO AD_TICKET_NUMBER/report s/database		Database Information on Upload Ticket: On completed jobs (Completed only) provide database information (UPLOAD_TICKET_NUMBER)	GET

The software architecture for the Batch Upload API is similar to the ImmPort Core Query API



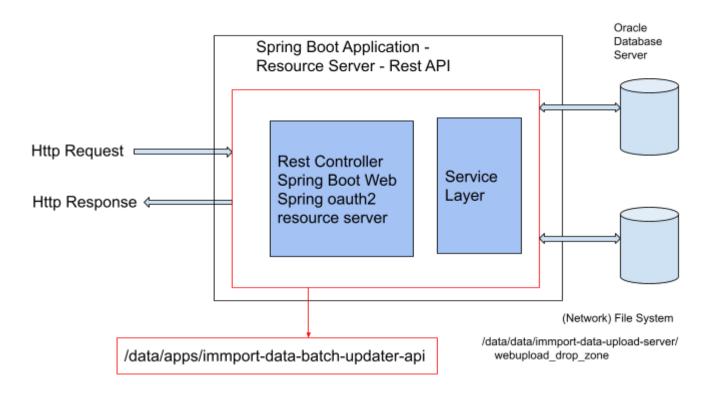
### 3.5.8.2. Batch Updater API

The endpoints of the Batch Updater API are listed below.

HTTP URL	Parameters (pass in the body of the request)	Description	GET/ POST
/data/batch/updater/documentation/te mplates		Documentation Generation: Generate documentation templates	GET
/data/batch/updater	-F "workspaceId=WORKSPACE_ID" -F "packageName=" -F "uploadNotes=UPLOAD_NOTES" -F "uploadPurpose=batchUpdateUpload -F "serverName=SERVER_NAME -F "file=@UPLOAD_BATCH_UPDATER_FILE_PATH_ON_CLIENT"	Batch Update Upload: Request upload of a zip-file; transfers file and creates upload registration and performs batch update requested	POST
/data/batch/updater	-F "workspaceId=WORKSPACE_ID" -F "packageName=" -F "uploadNotes=UPLOAD_NOTES" -F "uploadPurpose=batchUpdateValidate" -F "serverName=SERVER_NAME" -F "file=@UPLOAD_BATCH_UPDATER_FILE_PATH_ON_CLIENT"	Batch Update Upload for Validation: Batch update validation is a two step process where the batch update file is uploaded to the server and the upload registration generated (this endpoint), and then the validation is requested (see Validation of Upload Ticket endpoint)	POST
/data/batch/updater/validation	-F "uploadTicketNumber=UPLOAD_TICKET_NUMBER"	Validation of Upload Ticket: Validation a batch updater file that is identified by the upload ticket number; Note this endpoint uses the -F parameter, -F "uploadTicketNumber=UPLOAD _TICKET_NUMBER"	POST
/data/batch/updater/registration/UPL OAD_TICKET_NUMBER/status		Status of Upload Ticket: Return the current status of an upload	GET

	ticket (UPLOAD_TICKET_NUMBER)	
/data/batch/updater/registration/UPL OAD_TICKET_NUMBER/summary	Summary Information on Upload Ticket: On completed jobs (either Completed or Rejected), provide the information on the upload ticket (UPLOAD_TICKET_NUMBER)	GET
/data/batch/updater/registration/UPL OAD_TICKET_NUMBER/database	Database Information on Upload Ticket: On completed jobs (Completed only) provide database information (UPLOAD_TICKET_NUMBER)	GET
/workspaces	Set of Workspaces: Return the set of workspace(s) on which a user can perform and upload or validation	GET

The software architecture for the Batch Upload API is similar to the ImmPort Core Query API

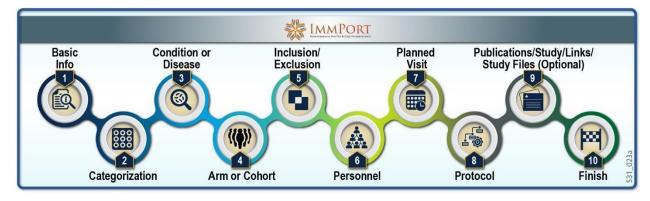


## 3.5.9. ImmPort Study Registration Wizard

To further streamline the data submission process, and address requests from our data providers to simplify data uploads, an easy-to-use UI Wizard is under development.. The Study Registration Wizard (SRW) is an interactive and intuitive tool for entering study data, validating data in real time and mapping terms reported to the standard ontology terms. The SRW accelerates the process of data submission and motivates data providers to submit their studies to the ImmPort repository in a timely manner. It also aids the process of storing their study data in the ImmPort repository and the generation of an ImmPort Study Accession that can be reported in publications. Additionally, this tool

empowers end users to load their research data with little to no assistance from the ImmPort staff, enhancing the scalability of uploads.

The figure below shows the data elements of a basic study design template as steps. The wizard takes the user through the different steps required to register a study with ImmPort. Steps 1 to 8 are required data elements and step 9 are optional data elements. Step 10 leads you to the page where you save the data or validate and submit for upload.



For additional assistance with uploads, SRW tutorials and documentation were integrated into the new documentation site. A current view of the Study Registration Interface can be seen in the below figure

Registration Home Study Registration ID <b>1012</b> for Workspace ID <b>4117</b>										
1	2	3	4	5	6	7	8	9	10	
isic Info	Categorization	Condition or Disease	Arm Or Cohort	Inclusion/Exclusion	Personnel	Planned Visit	Protocol	Publications/Study Links Optional	Study Files Optional	I
User Defined I study_1012	D/Submitter ID *			Ø	Brief Title/Stud	v Títla *				0
		ted workspace. (Cannot be upda	ated in Edit Mode)	10/15		y nuc				0 / 250
Study Offic	ial Title			0	sponsoning Or	ganization *				0
				0/50	0					0/250
Brief Descr	iption *									0
										0 / 4000
Detailed I	Description *									0
										•
Endpoint	s/Output Measurement	s/Clinical Assessments *								0

Select a Workspa	ice			× ~							
				Register a	New Study						
	_	n to start a new registration									
Register St	udy				_						
				Manage Existing S		rations					
iter text to search	the Study Regist	ration's			itidy regist	indions					
	ine enaly region										
		Registration Status	Upload Ticket Number	C Upload Status	Study Accession	Created By	Last Updated By	Date Last Updated (YYYY/MM/DD)	Edit	Delete	Submit for Upload
Registration ID 🎍	Submitter ID										
Registration ID ↓ 1323	Submitter ID study_1323	Pending				testadmin	testadmin	2023/09/26	🖋 Edit	🛍 Delete	🛓 Uplo

In the June 2022 software release the following functionalities were developed and deployed:

- Text box where users can enter their protocol information
- Support XLS and TSV options to upload row-level data for Planned visits, Inclusion/Exclusion, Arm/Cohort.
- Updated definitions for fields
- Add interactive feedback buttons to collect user feedback