



OREGON NATIONAL
PRIMATE
Research Center

The LabKey EHR Module at the Oregon National Primate Research Center

LABKEY USER CONFERENCE & WORKSHOP

5 OCTOBER 2017, SEATTLE

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WANPRC
WASHINGTON NATIONAL PRIMATE RESEARCH CENTER



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Our Menagerie

Colony Overview

This page is designed to give an overview of the colony

Population Composition

SPF Colony

Housing Summary

Utilization Summary

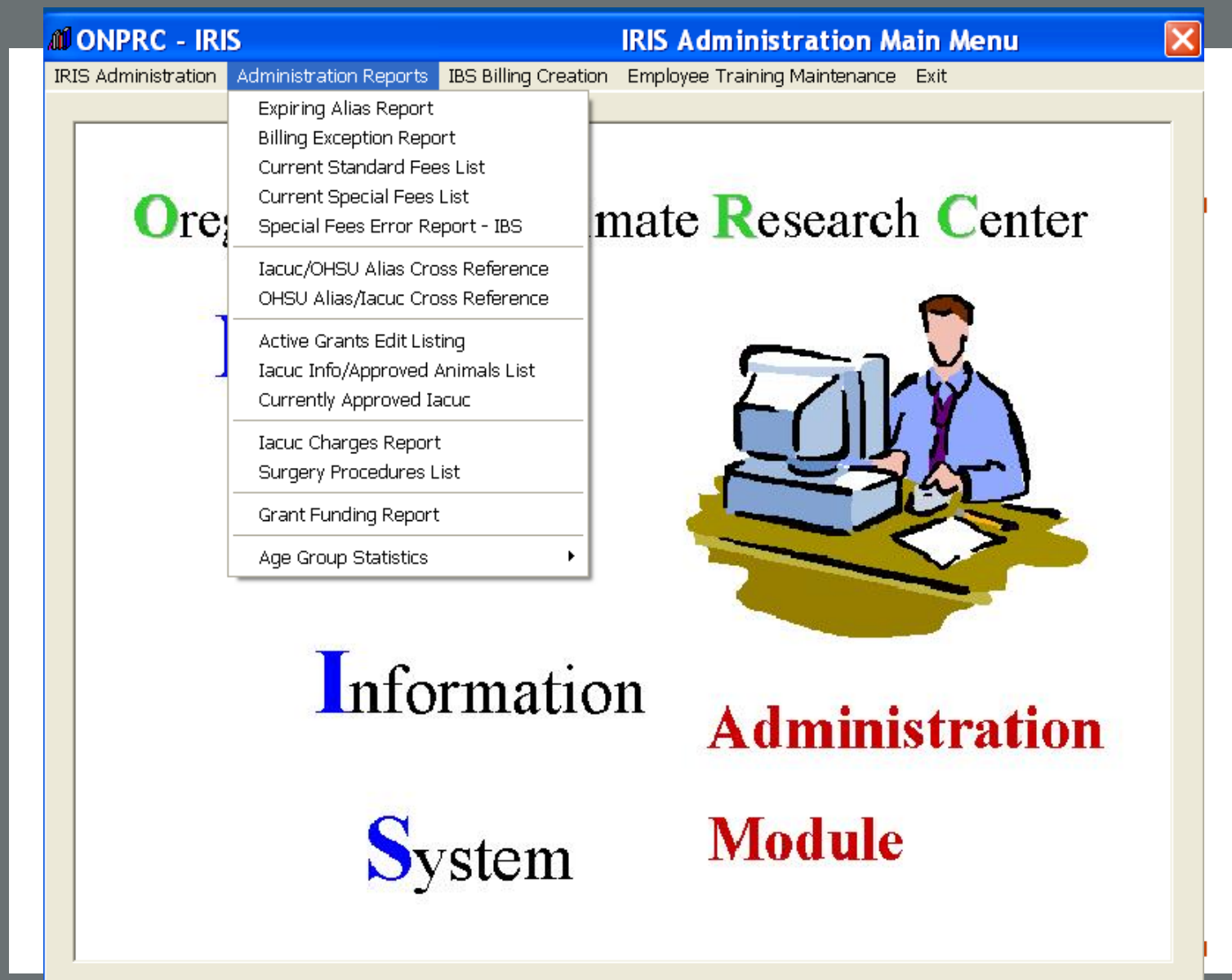
Clinical Case Summary

Current Population:

	Total	Senior		Adult		Juvenile				Infant	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
ANUBIS BABOON:	25	0	2	2	10	10	1	0	0	0	0
CYNOMOLGUS MACAQUE:	87	0	0	37	50	0	0	0	0	0	0
GUINEA PIG:	2	0	0	0	0	0	0	0	0	0	0
HAMADRYAS BABOON:	4	0	0	1	3	0	0	0	0	0	0
JAPANESE MACAQUE:	321	6	15	35	121	58	61	0	0	13	12
RHESUS MACAQUE:	4647	35	82	813	1636	841	763	0	0	243	234
SQUIRREL MONKEYS:	6	0	0	0	0	0	0	0	0	0	0

B.L.E.
(Before LabKey Era)

Visual Basic Modules: IRIS



Unfriendly to all but Microsoft

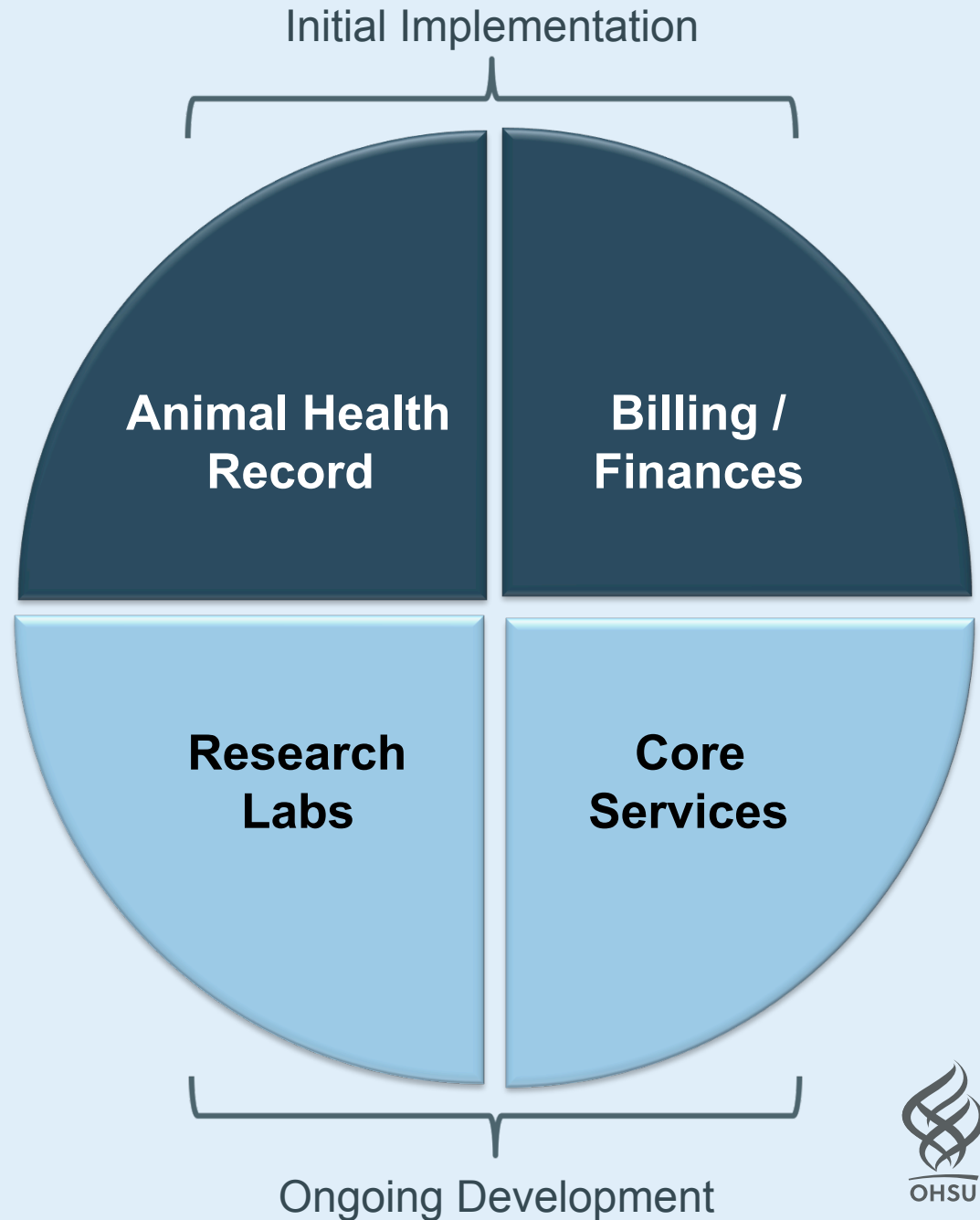


ONPRC LabKey Solution

PRIME

Overview

- LabKey platform
- Web-based
- Operational since 2013



Development Requirements

- Integrate lab data with animal health data
- Improve accuracy and efficiency in the collection, entry, and maintenance of animal health and husbandry data
- Provide an easily accessible, easily searchable data repository for researchers and clinicians
- Support compliance with current rules and regulations
- Deliver timely and accurate information for administration and billing

PRIMe

(**P**rimate **R**ecords & **I**nformation **M**anagement)



Home

ONPRC PRIME

Welcome to PRIME [Primate Records and Information Management]

Welcome to PRIME, the ONPRC system to manage colony and laboratory data. PRIME allows access to all aspects of the animal record, billing data, and some administrative information through a single, coherent place. PRIME also provides private sections for labs and groups affiliated with ONPRC to privately manage their own data. To navigate across the site, look in the menu bar for the 'Sections' menu. Below are links to learn more about the PRIME project and how to use the site:

- [What Is PRIME And How Can PRIME Help Me?](#)
- [How Do I Use The Site?](#)
- [How Do I Gain Access To The Site?](#)
- [Issue Tracker Policies](#)

We are always interested in your comments and feedback, and we encourage any suggestions using the support request link under the help menu. We hope you enjoy the site.

ONPRC



Admin



EHR



Labs



Cores & Resources



SLA

<Select Web Part>

ADD

<Select Web Part>

ADD

<Select Web Part>

ADD

<Select Web Part>

ADD



Technical Details

- EHR uses LabKey study for core animal data
- EHR Core module is shared
- ONPRC_EHR to customize basic EHR
- Additional modules for specific assays, Finance, SLA tracking
- ETLs for connectivity with LIMS, OGA, elacuc
- Many custom SQL queries in modules
- Use of LabKey APIs in Mathematica and other external scripts



Clinical Data Entry

BSU:

BSU EXAM
BSU ROUNDS
NHP TRAINING
PAIRING OBSERVATIONS

Billing:

MISC CHARGES

Clinical:

BLOOD DRAWS
BULK CLINICAL ROUNDS
CLINICAL ROUNDS
EXAMS/CASES
MEDICATIONS/DIET
POST OP MEDS SIGN OFF
TB TESTS
WEIGHTS

Lab Results:

ISTAT RESULTS
LAB RESULTS



More Clinical Data Entry

Colony Management:

ANIMAL GROUP ASSIGNMENT

ARRIVAL

BIRTH

DCM NOTES

DEATH

DEPARTURE

FLAGS

GENETIC ANCESTRY

HOUSING TRANSFERS

MATINGS

MENSES

NHPR PROCESSING

PARENTAGE

PREGNANCIES / PREGNANCY TESTS

PROCESSING

PROJECT ASSIGNMENT



Even More Clinical Data Entry

Pathology:

BIOPSY
NECROPSY
PATHOLOGY TISSUES

Research:

RESEARCH
PROCEDURES

SLA:

SLA CENSUS

Requests:

ASB SERVICES
COLONY SERVICES
HOUSING TRANSFER
LABWORK

Surgery:

SURGERIES
SURGERY
SURGICAL ROUNDS

Improve accuracy and efficiency

- Husbandry, Clinical, Surgical, and Necropsy Information
- All stages and phases of care captured and easily retrieved
 - Preventative care, physical examinations, and routine procedures easily entered
 - Standardized templates for clinical, surgical, and pathology procedures
- Bulk entry for common group procedures
 - TB tests, weight updates, blood draws
 - Routine exams, diagnostic exams, procedures

Clinical Alerts/Notifications

- Data integrity checking
- High incidence of clinical problems
- Weight drops
- Pairings and singly housed animals
- Unoccupied rooms
- Scheduled treatments not yet completed
- Service requests
- Clinical rounds needing vet review

Compliance

- Tracking required training for building and room access
- Overdue and upcoming training renewals
- Cage size vs. animal size
- Pairings and individually housed animals
- Animal utilization by protocol
- Allowable blood volume calculations

Easily accessible, easily searchable data

Metrics easily captured and viewed

- number and type of animals on campus
- animals assigned
- available space
- services provided
- billing



Colony Overview

Colony: Numbers and Types of Animals

Colony Overview

This page is designed to give an overview of the colony

Population Composition

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Housing Summary

Utilization Summary

Clinical Case Summary

Current Population:

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		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
ANUBIS BABOON:	25	0	2	2	10	10	1	0	0	0	0
CYNOMOLGUS MACAQUE:	87	0	0	37	50	0	0	0	0	0	0
GUINEA PIG:	2	0	0	0	0	0	0	0	0	0	0
HAMADRYAS BABOON:	4	0	0	1	3	0	0	0	0	0	0
JAPANESE MACAQUE:	321	6	15	35	121	58	61	0	0	13	12
RHESUS MACAQUE:	4647	35	82	813	1636	841	763	0	0	243	234
SQUIRREL MONKEYS:	6	0	0	0	0	0	0	0	0	0	0

Colony: Master Problems List

Colony Overview

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Population Composition **SPF Colony** **Housing Summary** **Utilization Summary** **Clinical Case Summary**

Clinical Summary:

Open Cases:

Category	Total	%
Clinical	140	2.75
Surgery	64	1.26

Open Problems:

Category	Total	%
Behavioral	293	5.76
Cardiac Abnormality	10	0.2
Dermatopathy	40	0.79
Endocrinopathy	8	0.16
GI-Diarrhea	95	1.87
GI-Other	85	1.67
MS Abnormality	45	0.88
Neurologic Abnormality	1	0.02
None	5	0.1
OBGYN Condition	11	0.22
Ophthalmic Abnormality	3	0.06
Other	13	0.26
Research Support	13	0.26
Respiratory Abnormality	10	0.2
Routine or Preventative care	134	2.63
Urogenital	17	0.33
Weight Loss	96	1.89
Wound	82	1.61

Type and number
of cases across
campus and by
Master Problem

Colony: Housing Summary

Colony Overview

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Population Composition

SPF Colony

Housing Summary

Utilization Summary

Clinical Case Summary

Cage Usage:

Building	Total Cages	Empty Cages	% Used
ASB III:	516	52	89.53%
ASA:	172	22	87.21%
ASB I:	394	64	82.99%
ASB II:	206	61	70.39%
Unknown:	14	5	64.29%
Colony:	205	85	57.07%
Colony Annex:	155	84	45.81%
PENS:	31	22	29.03%

Housing Type Summary:

Cage Location:	2031 (39.89%)
Corral Location:	1577 (30.98%)
Group Location:	396 (7.78%)
Rodent Location:	2 (0.04%)
Sheltered Housing:	1085 (21.31%)

Pairing Summary:

Cage, Grooming:	51 (1%)
Cage, Paired:	1429 (28.07%)
Cage, Single:	551 (10.82%)
Group:	3060 (60.11%)

Reports by:

- building
- type of caging

Colony > Housing Summary: Space Management

Area ▲	Room	Housing Condition	Housing Type	Total Cages Present	Cages Used	Marked Unavailable	Cages Empty	% Used	Total Animals
ABSL3 North Suite	ASA RM 136 A	ABSL2	Cage Location	12	8	0	4	66.7	12
ABSL3 North Suite	ASA RM 136 B	ABSL2	Cage Location	9	0	0	9	0.0	0
ABSL3 South Suite	ASA RM 135 A	ABSL2	Cage Location	10	9	0	1	90.0	17
ABSL3 South Suite	ASA RM 135 B	ABSL2	Cage Location	9	8	0	1	88.9	16
ASA Conventional	ASA RM 1	ABSL2	Cage Location	29	29	0	0	100.0	61
ASA Conventional	ASA RM 2	ABSL2	Cage Location	30	28	0	2	93.3	53
ASA Conventional	ASA RM 3	ABSL2	Cage Location	30	29	0	1	96.7	55
ASA Conventional	ASA RM 4	ABSL2	Cage Location	34	34	0	0	100.0	48
ASA Conventional	ASA RM 5	ABSL2	Cage Location	9	5	0	4	55.6	9

Summary report of rooms
within a building

Colony > Housing Summary > Space Management: Cage Size and Position

Room: ASA RM 135 A

Note: a solid line indicates a solid divider, dotted line indicates mesh, and dashed indicates grooming contact.

A1 (6.5) 33046: 4.4 33539: 5.9 33883: 5.4	A2 (6.5)	A3 (6.5)	A4 (6.5) 32088: 6.1 35843: 7.1	A5 (6.5)
B1 (6.5T) 35804: 4.2 35809: 4.8 35830: 5.3	B2 (6.5T)	B3 (6.5T)	B4 (6.5T) 35805: 4.9 35838: 5.1	B5 (6.5T)
No Cage	C2 (6.5)	C3 (6.5) 35810: 4.4	C4 (6.5) 35806: 4	C5 (6.5) 35803: 4.4
No Cage	D2 (6.5T) 35817: 4.9 35823: 3.9	D3 (6.5T)	D4 (6.5T) 35812: 4.7 35837: 5.5	D5 (6.5T)

Visual report of a
specific room

Automated billing

- Lease and setup fees including day lease and Time Mated Breeders
- Animal per diems based on housing type
- Blood draws
- Injections
- Diet supplements and Special Diets
- Procedures

Timely & accurate information for billing

- Manually entered charges
(i.e. Pathology services, technician time,
MRI charges, supplies reimbursement)
- Billing period summary reports
- Anticipated billing reports
- Investigator access to past and anticipated billing
- Rate sheets centralized and available to all

Financial Alerts/Notifications

- Expired accounts
- Missing accounts
- Expired or inactive projects
- Projects ending within 30 days



Issue Trackers

- EHR
- Finance
- Information Systems



Results/Benefits realized

- Grids for ad hoc reporting
- Permissions management for focused access
- Financial data access for investigators
- Improved data consistency



Best Practices/Lessons Learned

- Defining permissions for system access
- Optimize queries and other processes
- Document as you go
- Regular meetings with the user community



Future Plans

- New reporting process to replace SSRS
- New LIS implementation
- Real time data entry
- Greater collaboration between Primate Centers and other research institutions

Thank You



OREGON NATIONAL
PRIMATE
Research Center

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Appendix: Daily Admin Alerts

Daily Admin Alerts by Email

From: Production Server

Sent: Friday, September 29, 2017 5:05 AM

Subject: Daily Admin Alerts: 2017-09-29 05:05

This email contains a series of alerts designed for site admins.
It was run on: 2017-09-29 05:05.

The following alerts were generated:

The size of the database labkey-seq has changed significantly
since the last run on 2017-09-28 05:04

Site Logins in Past 7 Days

Day of Week	Date	Logins	Distinct Users	Logins / User
Fri	2017-09-22	489	126	3.881
Sat	2017-09-23	137	21	6.524
Sun	2017-09-24	123	19	6.474
Mon	2017-09-25	547	136	4.022
Tue	2017-09-26	535	149	3.591
Wed	2017-09-27	555	153	3.627
Thu	2017-09-28	496	144	3.444

Top 20 Largest Tables (by row count)

Schema	Table	# of Rows	Previous Value	% Change
audit	c3d323_queryupdateauditdomain	24,245,551	24,208,549	0.2%
ehr	kinship	17,894,150	17,894,150	0%
audit	c3d312_datasetauditdomain	8,955,414	8,946,152	0.1%
sequenceanalysis	sequence_coverage	5,502,055	5,502,055	0%
studyDataset	c6d178_drug	4,402,544	4,401,948	0%
studyDataset	c6d168_hematologyresults	3,497,870	3,496,888	0%
sequenceanalysis	alignment_summary_junction	3,483,874	3,483,874	0%
sequenceanalysis	nt_snps_by_pos	3,339,518	3,339,518	0%
studyDataset	c6d214_encounters	2,870,834	2,870,657	0%
ehr	snomed_tags	2,480,536	2,480,021	0%
studyDataset	c6d171_clinical_observations	2,471,415	2,469,661	0.1%
sequenceanalysis	aa_snps_by_codon	2,358,840	2,358,840	0%
onprc_billing	invoicedItems	2,012,748	2,012,748	0%
studyDataset	c6d185_clinremarks	1,534,135	1,533,764	0%
studyDataset	c6d206_chemistryresults	1,404,436	1,404,033	0%
studyDataset	c6d175_weight	1,015,468	1,015,223	0%
assayresult	c3d161_genotype_result_fields	995,700	995,700	0%
studyDataset	c6d208_treatment_order	985,250	985,127	0%
list	c18d506_cognosquery	978,291	978,291	0%
assayresult	c3d262_snp_result_fields	943,619	943,619	0%



Database Sizes

Database	Logical Name	Size (MB)	Previous Size	% Change
Labkey	labkey	110 GB	110 GB	0%
tempdb	tempdev	90 GB	90 GB	0%
tempdb	templog2	63 GB	63 GB	0%
tempdb	templog3	55 GB	55 GB	0%
tempdb	templog1	48 GB	48 GB	0%
Labkey	labkey_log	21 GB	21 GB	0%
labkey-seq	labkey-seq	11 GB	10 GB	12.3%
IRIS_Production	IRIS_Production_Data	7 GB	7 GB	0%
Labkey_Public	LKAdmin	5 GB	5 GB	0%
Labkey_Public	LKAdmin_log	3 GB	3 GB	0%
labkey-seq	labkey-seq_log	2 GB	2 GB	0%
RBAT	RBAT_Data	1 GB	1 GB	0%
ohsu_sqltab	ohsu_sqltab	1 GB	1 GB	0%
msdb	MSDBData	1 GB	1 GB	0%
fflexesuite	fflexesuite_log	626 MB	626 MB	0%
fflexesuite	fflexesuite	603 MB	603 MB	0%
msdb	MSDBLog	493 MB	493 MB	0%
ReportServerTempDB	ReportServerTempDB	336 MB	336 MB	0%
ReportServer	ReportServer_log	297 MB	297 MB	0%
IRIS_Production	IRIS_Production_Log	293 MB	293 MB	0%
tempdb	templog	149 MB	149 MB	0%
ReportServer	ReportServer	130 MB	130 MB	0%
ReportServerTempDB	ReportServerTempDB_log	99 MB	99 MB	0%
RBAT	RBAT_Log	73 MB	73 MB	0%
model	modellog	34 MB	34 MB	0%



Study Summary

Study Name	Container Path	Number of records	Previous Value	% Change
JMacResource Study	/ONPRC/Core Facilities/JMac Resource	0	0	
Primate Electronic Health Record	/ONPRC/EHR	22,959,218	22,953,931	0%
Primate Electronic Health Record	/EHR_Demo	33,924	33,924	0%

Assay Summary

Provider	Protocol	Container Path	# Runs	# Results	Previous Value	% Change
Affymetrix	Test Assay	/ONPRC/Labs/McBride/Assay Tutorial	0	0	0	
ELISPOT_Assay	ELISPOT	/Shared	1,106	58,201	58,201	0%
Flow	Flow	/ONPRC/Labs/Sacha	1	7	7	0%
General	Activity	/ONPRC/Labs/McBride	1	24	24	0%
General	Adjuvent Assay	/ONPRC	0	0	0	
General	Generic Assay	/ONPRC/Labs/McBride/Assay Tutorial	0	0	0	
General	Neutralizing antibody assay	/ONPRC/Labs/McBride	2	16	16	0%
General	Vector Copy Number	/ONPRC/Labs/McBride	1	142	142	0%
General	Volumetrics	/ONPRC/Labs/McBride	1	11	11	0%
Genotype Assay	Genotype	/Shared	3,005	995,700	995,700	0%
Hormone Assay	Hormone	/Shared	213	4,270	4,262	0.2%
ICS	ICS	/Shared	0	0	0	
Immunophenotyping	Immunophenotyping	/Shared	1	6	6	0%
SNP Assay	SNP	/Shared	36	943,619	943,619	0%
SSP Typing	SSP	/Shared	159	40,998	40,998	0%
SSP Typing	TaqMan	/ONPRC/Core Facilities/Genetics Core/MHC_Typing	12	264	264	0%
Viral Loads	Viral_Load	/Shared	183	13,670	13,670	0%



Lists Summary: Top 20 by Size

Table Name	Container Path	# of Rows	Previous Value	% Change
CognosQuery	/ONPRC/Admin/Finance	978,291	978,291	0%
PDARSURGIBSExtract	/ONPRC/Admin/Finance/6	99,675	99,675	0%
MHCDData	/ONPRC/DCM/NHP Resources	59,530	59,530	0%
SLAUIBSExport	/ONPRC/Admin/Finance/6	19,208	19,208	0%
Weights	/ONPRC/Labs/Grant	12,726	12,726	0%
BSUOnDateObserved	/ONPRC/DCM/BSU/1	11,216	11,216	0%
SurgerySchedule	/ONPRC/DCM/SSU	11,095	11,095	0%
Observations	/ONPRC/Labs/Zelinski	6,495	6,495	0%
SamplesSent	/ONPRC/Core Facilities/Genetics Core/Parentage	5,440	5,440	0%
BSUObservedAnimals	/ONPRC/DCM/BSU/1	4,206	4,206	0%
GeneticValue	/ONPRC/DCM/NHP Resources	4,013	4,013	0%
Ages	/ONPRC/Core Facilities/MRI Core	2,901	2,901	0%
TestAnimals	/ONPRC/Admin/IS/4	2,235	2,235	0%
BSUAnimalLocations	/ONPRC/DCM/BSU/1	1,761	1,761	0%
InfantsList	/ONPRC/DCM/BSU/1	1,482	1,482	0%
BSUMenstrualStudyIDs	/ONPRC/DCM/BSU/10	1,235	1,235	0%



File Root Sizes

Folder Path	File Path	Size	Previous Value	% Change	Total Files	Previous Value	% Change
/	/lkfiles/files	1 TB	1 TB	0%	246,766	246,764	0%
/home	/lkfiles/files/home	52 MB	52 MB	0%	36	36	0%
/EHR_Demo	/lkfiles/files/EHR_Demo	0 bytes	0 bytes		0	0	
/ONPRC	/lkfiles/files/ONPRC	1 TB	1 TB	0%	238,420	238,418	0%
/Public	/lkfiles/files/Public	20 KB	20 KB	0%	1	1	0%
/Shared	/lkfiles/files/Shared	2 MB	2 MB	0%	8,309	8,309	0%

Tasks Created Yesterday

Folder	Form Type	Total
/ONPRC/EHR	Exams/Cases	93
/ONPRC/EHR	Surgeries	70
/ONPRC/EHR	Lab Results	45
/ONPRC/EHR	Research Procedures	14
/ONPRC/EHR	Housing Transfers	13
/ONPRC/EHR	Clinical Rounds	12
/ONPRC/EHR	Post Op Meds Sign Off	8
/ONPRC/EHR	Weights	8
/ONPRC/EHR	Bulk Clinical Entry	7
/ONPRC/EHR	Pairing Observations	7
/ONPRC/EHR	Medications/Diet	6
/ONPRC/EHR	Surgical Rounds	5
/ONPRC/EHR	Surgery	4
/ONPRC/EHR	Blood Draws	3
/ONPRC/EHR	BSU Rounds	3
/ONPRC/EHR	Necropsy	3
/ONPRC/EHR	Pathology Tissues	3
/ONPRC/EHR	Menses	2
/ONPRC/EHR	Animal Group Assignment	1
/ONPRC/EHR	Charges	1
/ONPRC/EHR	Birth	1
/ONPRC/EHR	NHPR Processing	1
/ONPRC/EHR	Project Assignment	1



Records Created Yesterday

Folder	Dataset Name	Rows Not Created By Admin	Public Records Modified
/ONPRC/EHR	Animal Group Members	9	8
/ONPRC/EHR	Animal Record Flags	23	4
/ONPRC/EHR	Antibiotic Sensitivity	24	0
/ONPRC/EHR	Assignment	1	5
/ONPRC/EHR	Birth	4	0
/ONPRC/EHR	Blood Draws	174	11
/ONPRC/EHR	Cases	37	58
/ONPRC/EHR	Chemistry Results	403	0
/ONPRC/EHR	Clinical Encounters	177	36
/ONPRC/EHR	Clinical Observations	1758	319
/ONPRC/EHR	Clinical Remarks	371	35
/ONPRC/EHR	Clinpath Runs	87	21
/ONPRC/EHR	Deaths	4	0
/ONPRC/EHR	Demographics	0	4
/ONPRC/EHR	Drug Administration	596	13
/ONPRC/EHR	Gross Findings	10	11
/ONPRC/EHR	Hematology Results	982	0
/ONPRC/EHR	Histology	39	8
/ONPRC/EHR	Housing	43	42
/ONPRC/EHR	Microbiology Results	15	0
/ONPRC/EHR	Misc Tests	1	0
/ONPRC/EHR	Notes	1	2
/ONPRC/EHR	Pairing Observations	26	0
/ONPRC/EHR	Pathology Diagnoses	0	37
/ONPRC/EHR	Problem List	20	0
/ONPRC/EHR	Tissue Distributions	31	0
/ONPRC/EHR	Tissue Measurements	6	0
/ONPRC/EHR	Tissue Samples	95	0
/ONPRC/EHR	Treatment Orders	123	38
/ONPRC/EHR	Weight	246	1

