AMDCC

THE ANIMAL MODELS OF DIABETIC
COMPLICATIONS CONSORTIUM

AMDCC Coordinating and Bioinformatics Unit

1) Web portal overview

2) Website Enhancements and New Features

3) Future Work and Enhancements

Web Portal Overview

AMDCC STATS	
Experiments	
In Progress	41
Public	19
Total	60
Microarrays	
Total	0
Models	
In Progress	76
Public	2
Total	78
Protocols	
Total	48
Publications	
In Press/Published	24
Strains	
Breeding complete	8
Breeding ongoing	21
Characterizing multiple lines	3
Embryonic rederivation	1
Not specified/Other	1
Phenotyping complete	3
Phenotyping final	2
Phenotyping ongoing	23
Total	62

Previous Steering Committee meeting

Experiments: 6 (4616 measurements)
Models: 4
Strains: 6
Publications: 8

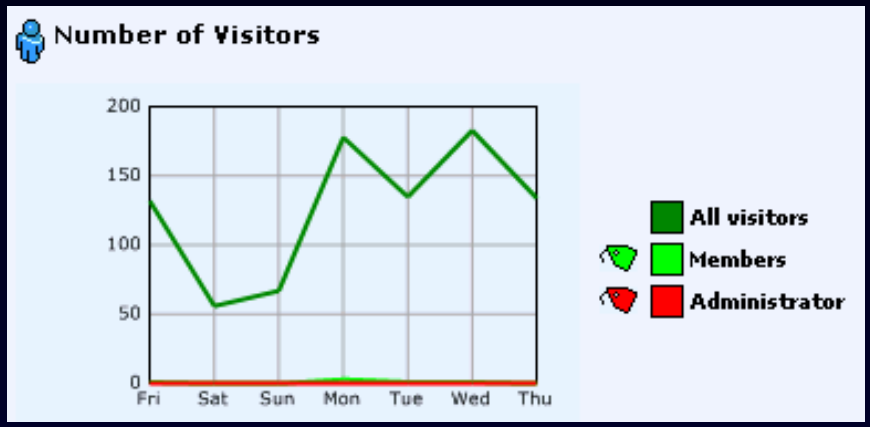
Since last Steering Committee meeting

Experiments: 12 (10371 measurements)
Models: 2
Strains: 7
Publications: 4

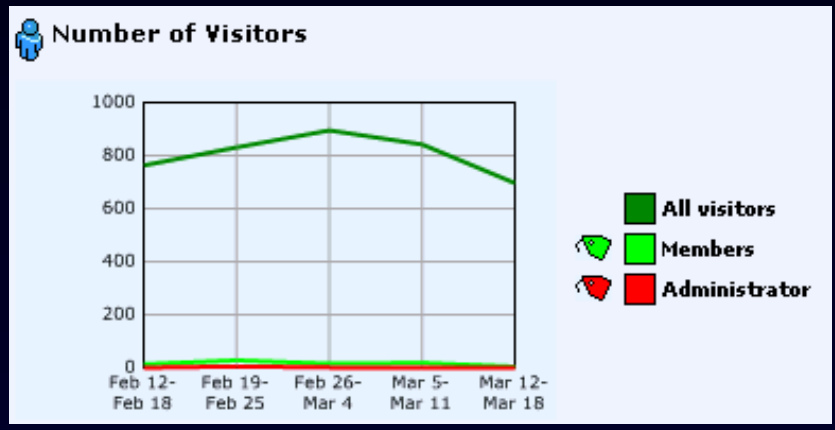
Average number of visitors per month: 3234 (15**% Increase**)

Average number of visitors per day: 108

Sample Week



Sample Month



All numbers reflect non-AMDCC members

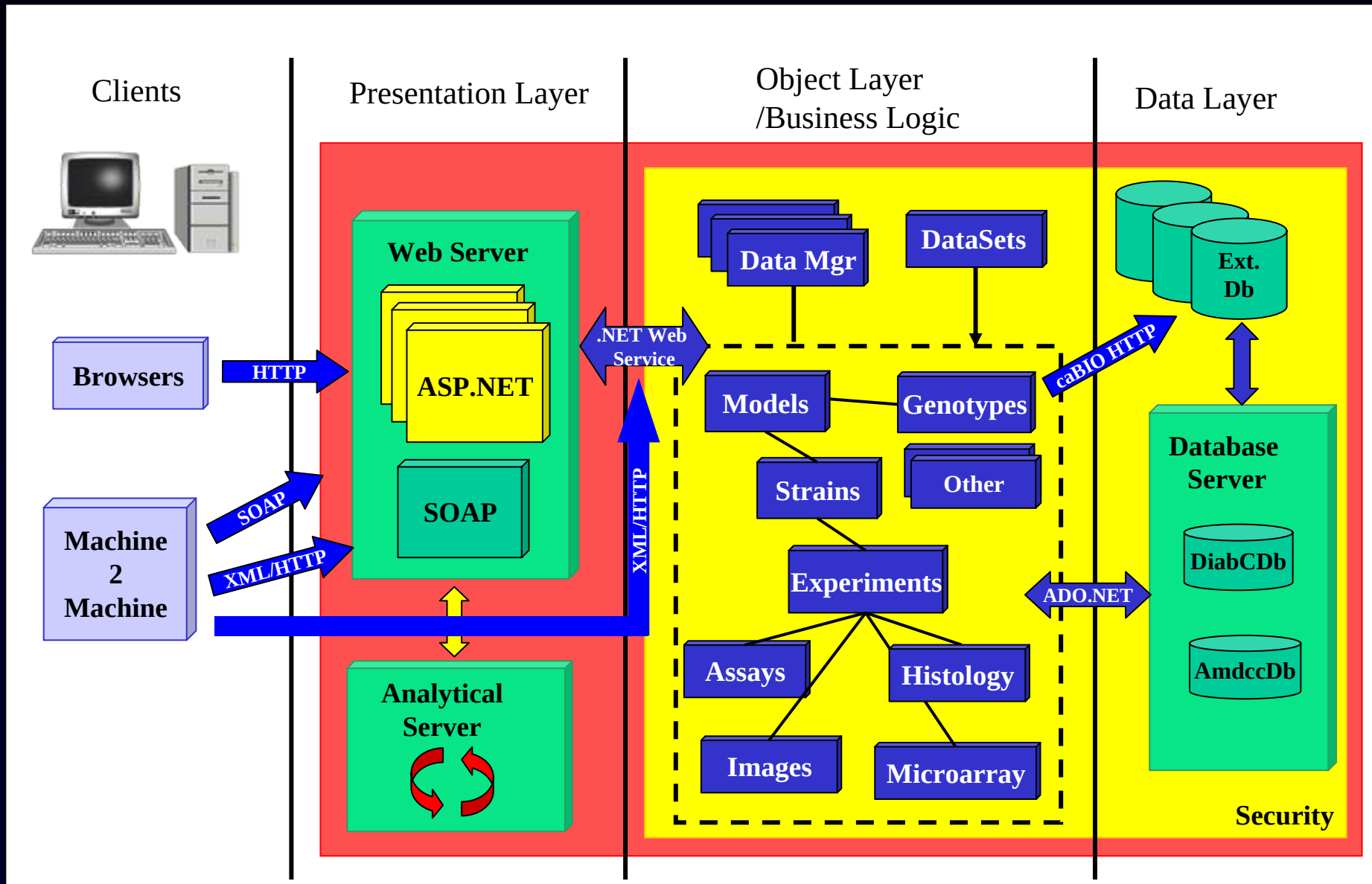
Top Search Engine Referrers

Google	58.5%
Yahoo!	6.1%
MSN	2.6%
www.niddk.nih.gov	0.8%
en.wikipedia.org	0.5%
dels.nas.edu	0.5%
www.cbqm.mcg.edu	0.3%
AOL	0.3%
webdev.niddk.nih.gov	0.3%
Netscape	0.2%
grants.nih.gov	0.2%
www.answers.com	0.2%
jasn.asnjournals.org	0.2%
Dogpile	0.2%
AltaVista	0.1%
Other	2.0%
None	26.9%

Top Search Terms

glomerular filtration rate	2.9%
tbars	2.8%
amdcc	1.3%
catalase assay	1.1%
mouse dissection	1.0%
thiobarbituric acid	0.9%
tbars assay	0.7%
diabets	0.7%
ipgtt	0.7%
thiobarbituric acid reactive substances	0.6%
glucose clamp	0.5%
streptozotocin	0.4%
diabetic complications	0.4%
portal overview	0.3%
tbars protocol	0.3%
langendorff	0.3%
fplc	0.3%
intraperitoneal glucose tolerance test	0.2%
tail flick	0.2%
aortic sinus	0.2%
nadh oxidase	0.2%
amplex red	0.2%
mes buffer	0.2%
fitc-inulin	0.2%
animal models of diabetic complications consortium	0.2%
mouse echocardiography	0.2%
aortic banding	0.2%
"www.amdcc.org" documents	0.1%
10x tbs	0.1%
glomerular filtration	0.1%
Other	49.8%
None	32.6%

AMDCC IT Structure

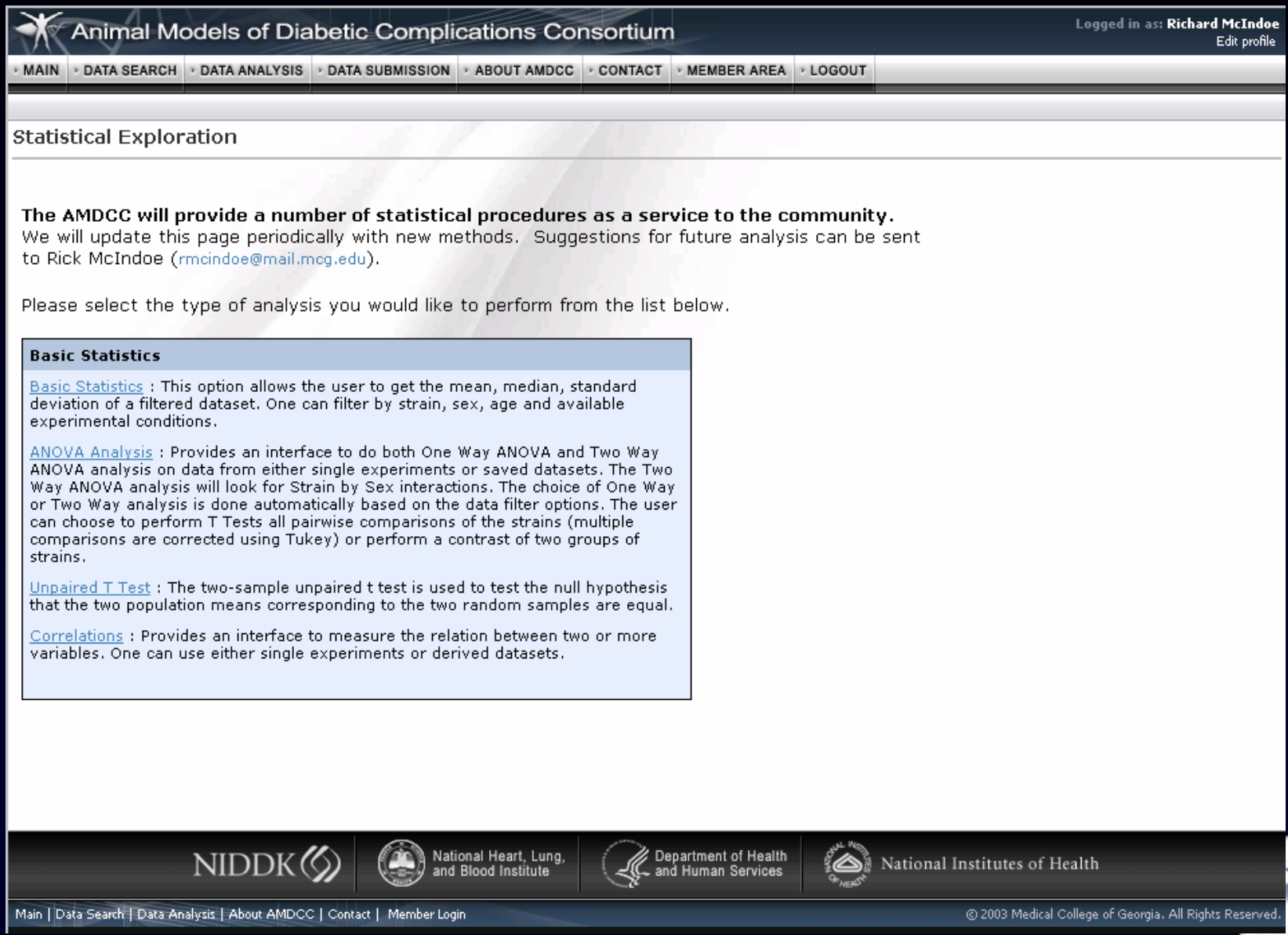


AMDCC Web portal Enhancements and New Features

- Improved movement between statistics tools and charting tools.
- Completed FAQ and Training modules for public/members
- Completed Analysis Engine Framework
- Developing microarray user interfaces to search and retrieve data
- Developing microarray analysis modules

Improved movement between statistics tools and charting tools.

Based on Matt Breyer's request from last steering committee meeting.



Basic Statistics

This page will allow the user to analyze a single experiment or AMDCC dataset. The user will select the filter criteria for the data he/she wants for the analysis and click the 'Get Stats' button. Basic statistical information will be calculated for the data based on the filter criteria.

Select a saved DataSet: [No selection] *New* **OR**

Select an Experiment: Coffman: Evaluation of STZ-induced DM in common laboratory strains

Get Stats

There are a total of 1986 measurements in this experiment

Select the Assay to Analyze and any filter criteria

Assays

- blood glucose (mg/dL)
- ualb (µg/ml)
- L Kid Wt (g)
- ualb/ucreat ratio (µg/mg)
- R Kid Wt (g)
- ucreat (mg/dL)
- sBP (mmHg)
- W rodent (g)

Strains

- 129S6/SvEv
- BALB/cJ
- C57BL/6J
- DBA/2J
- MRL/MpJ

Sex

Both

Age @ Sample Date

Leave blank for all

from **to**

Experimental Conditions

time since Type 1 Diabetes onset (week)

- -1
- 0
- 9
- 6
- 23
- 15
- 12
- 13
- 17
- 2
- 20
- 8
- 16
- 7
- 3
- -3
- 19

IP STZ dosage plan

- stz1
- control

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AMDCC Basic Statistics Results

Data Filter Criteria
Sex: Both
Age: no age filter given
Experimental Factors:
IP STZ dosage plan: stz1

The data is from the following experiments:
Evaluation of STZ-induced DM in common laboratory strains

Select a chart to view the selected data.
○ Column Chart ○ Line Chart ○ XY Chart

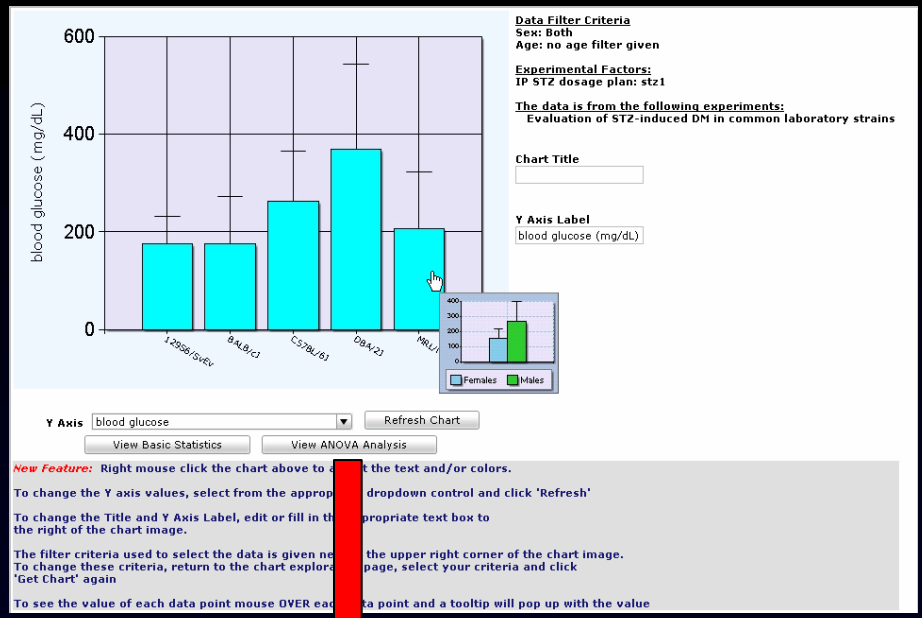
Assay	Strain	Sex	Num	Avg	Stdev	Median	Min	Max	Var	Skewness	Kurtosis
blood glucose (mg/dL)	129S6/SvEv	Both	56	176.036	55.073	140	93	370	3033.07	1.323	1.908
		Females	28	154.607	40.238	130	93	270	1619.096	1.034	1.021
		Males	28	197.464	59.403	155	126	370	3528.677	1.202	0.962
	BALB/cJ	Both	70	176.329	96.736	114	66	444	9357.821	1.309	0.51
		Females	35	116.914	21.257	105	66	164	451.85	0.248	0.142
		Males	35	235.743	105.847	163	86	444	11203.677	0.381	-1.124
	C57BL/6J	Both	48	261.875	103.491	-	119	600	10710.401	0.939	0.81
		Females	24	211.875	80.121	-	119	411	6419.359	0.958	-0.157
		Males	24	311.875	100.007	-	185	600	10001.443	1.052	0.86
	DBA/2J	Both	70	368.3	175.489	209	111	600	30796.524	-0.107	-1.507
		Females	38	275.289	151.88	136.5	111	600	23067.574	0.603	-1.038
		Males	32	478.75	132.297	413	130	600	17502.438	-1.002	-0.14
	MRL/MpJ	Both	61	207.115	115.456	127.5	75	524	13330.036	1.137	0.463
		Females	33	155.606	63.559	121.5	75	296	4039.693	0.828	-0.396
		Males	28	267.821	132.163	144.5	94	524	17467.147	0.456	-1.026
L Kid Wt (g)	129S6/SvEv	Both	14	0.159	0.027	-	0.121	0.203	0.001	0.063	-1.368
		Females	7	0.135	0.011	-	0.121	0.153	0	0.163	-1.036

Select a chart to view the selected data.
◉ Column Chart ○ Line Chart ○ XY Chart
Submit **Y Axis:** blood glucose (mg/dL) ▼

Select a chart to view the selected data.
○ Column Chart ◉ Line Chart ○ XY Chart
Submit **Y Axis:** blood glucose (mg/dL) ▼ **X Axis:** time since Type 1 Diabetes onset ▼

Select a chart to view the selected data.
○ Column Chart ○ Line Chart ◉ XY Chart
Submit **Y Axis:** blood glucose (mg/dL) ▼ **X Axis:** time since Type 1 Diabetes onset ▼

AMDCC



AMDCC Basic Statistics Results

Data Filter Criteria
Sex: Both
Age: no age filter given
Experimental Factors:
IP STZ dosage plan: stz1

The data is from the following experiments:
Evaluation of STZ-induced DM in common laboratory strains

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Column Chart | Line Chart | XY Chart

Submit **Y Axis:** blood glucose (mg/dL)

Assay	Strain	Sex	Num	Avg	Stdev	Median	Min	Max	Var	Skewness	Kurtosis
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AMDCC ANOVA Analysis

Based on the filter options either a One way ANOVA or Two way ANOVA is performed.
If the number of Strains > 2 and all animals of one sex, then a One way ANOVA is performed.
If the number of Strains > 2 and data has both males and females, then a Two way ANOVA is performed to determine if there are Sex by Strain interactions.

For each ANOVA, the user can decide whether to compare two groups of strains (contrasts) or output all possible pairwise comparisons for the strains selected.
The Two way ANOVA can handle data from an unbalanced design.

blood glucose

ANOVA Options

Analyze groups of strains
All pairwise strain comparisons

Perform ANOVA

Average

Strain	F	M	Overall
129S6/SvEv	154.6071	197.4643	176.0357
BALB/cJ	116.9143	235.7429	176.3286
C57BL/6J	211.8750	311.8750	261.8750
DBA/2J	275.2895	478.7500	368.3000
MRL/MpJ	155.6061	267.8214	207.1148
Overall	184.1899	299.8912	239.9541

Count

Strain	F	M	Overall
129S6/SvEv	28	28	56
BALB/cJ	35	35	70
C57BL/6J	24	24	48
DBA/2J	38	32	70
MRL/MpJ	33	28	61
Overall	158	147	305

Two Way ANOVA Results: ***Strain by Sex Interaction is significant***

Source	Degrees of Freedom	Sum of Squares	Mean Square	F statistic	P value
Strain	4	1886703.720	471675.930	46.301	**0.00000000**
Sex	1	993616.937	993616.937	97.536	**0.00000000**
Interaction	4	210058.734	52514.683	5.155	**0.00049979**
Error	295	3005216.123	10187.173		
Total	304	6061989.357			

Requested Details for: ***All Pairwise Comparisons (Tukey Correction) - Males*** Strains

Strain 1	Strain 2	P value	Chart	Plot Charts
129S6/SvEv	BALB/cJ	0.56603291		
129S6/SvEv	C57BL/6J	**0.00056397**		
129S6/SvEv	DBA/2J	**1.270 x 10^{-10}**		

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The Two way ANOVA can handle data from an unbalanced design.

blood glucose

ANOVA Options

- Analyze groups of strains
- All pairwise strain comparisons

Perform ANOVA

Average			
Strain	F	M	Overall
129S6/SvEv	154.6071	197.4643	176.0357
BALB/cJ	116.9143	235.7429	176.3286
C57BL/6J	211.8750	311.8750	261.8750
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DBA/2J	38	32	70
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Overall	158	147	305

Two Way ANOVA Results: *Strain by Sex Interaction is significant*

Source	Degrees of Freedom	Sum of Squares	Mean Square	F statistic	P value
Strain	4	1886703.720	471675.930	46.301	**0.00000000**
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Error	295	3005216.123	10187.173		
Total	304	6061989.357			

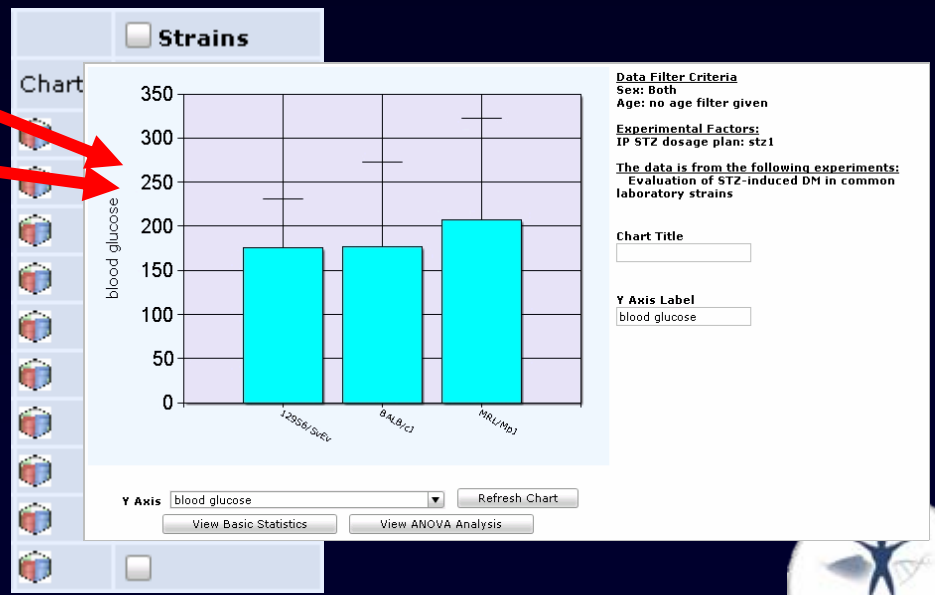
Requested Details for: *All Pairwise Comparisons (Tukey Correction) - Males*

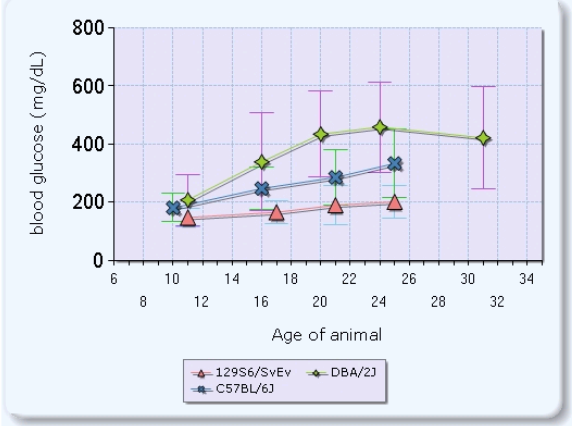
Strain 1	Strain 2	P value	Chart
129S6/SvEv	BALB/cJ	0.56603291	
129S6/SvEv	C57BL/6J	**0.00056397**	
129S6/SvEv	DBA/2J	**1.270×10^{-10}**	
129S6/SvEv	MRL/MpJ	0.07143769	
BALB/cJ	C57BL/6J	**0.03784622**	
BALB/cJ	DBA/2J	**1.270×10^{-10}**	
BALB/cJ	MRL/MpJ	0.71981882	
C57BL/6J	DBA/2J	**2.933×10^{-8}**	
C57BL/6J	MRL/MpJ	0.51848391	
DBA/2J	MRL/MpJ	**1.272×10^{-10}**	

Requested Details for: *All Pairwise Comparisons (Tukey Correction) - Females*

Strain 1	Strain 2	P value	Chart
129S6/SvEv	BALB/cJ	0.58092564	
129S6/SvEv	C57BL/6J	0.24972093	
129S6/SvEv	DBA/2J	**0.00002472**	
129S6/SvEv	MRL/MpJ	0.99999950	
BALB/cJ	C57BL/6J	**0.00406784**	
BALB/cJ	DBA/2J	**1.196×10^{-9}**	
BALB/cJ	MRL/MpJ	0.51148730	
C57BL/6J	DBA/2J	0.11555296	
C57BL/6J	MRL/MpJ	0.23234223	
DBA/2J	MRL/MpJ	**0.00001052**	

Plot Charts





Data Filter Criteria
Sex: Both
Age: no age filter given

Experimental Factors:
IP STZ dosage plan: stz1

The data is from the following experiments:
Evaluation of STZ-induced DM in common laboratory strains

Chart Title

Y Axis Label
blood glucose (mg/dL)

X Axis Label
Age of animal

Y Axis blood glucose

View Basic Statistics | View ANOVA Analysis

To change the X and Y axis values, select from the appropriate dropdown control and click 'Refresh'

To change the Title, Y Axis Label and X Axis label, edit or fill in the appropriate text box to the right of the chart image.

AMDCC Basic Statistics Results

Data Filter Criteria
Sex: Both
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Experimental Factors:
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blood glucose

ANOVA Options
Analyze groups of strains
All pairwise strain comparisons

Perform ANOVA

Average

Strain	F	M	Overall
129S6/SvEv	154.6071	197.4643	176.0357
C57BL/6J	211.8750	311.8750	261.8750
DBA/2J	275.2895	478.7500	368.3000
Overall	220.8333	337.3095	277.0632

Count

Strain	F	M	Overall
129S6/SvEv	28	28	56
C57BL/6J	24	24	48
DBA/2J	38	32	70
Overall	90	84	174

Two Way ANOVA Results: *Strain by Sex Interaction is significant*

Source	Degrees of Freedom	Sum of Squares	Mean Square	F statistic	P value
Strain	2	1275091.876	637545.938	54.235	**0.00000000**
Sex	1	564862.386	564862.386	48.052	**8.504×10^{-11}**
Interaction	2	208729.111	104364.555	8.878	**0.00021614**
Error	168	1974882.709	11755.254		
Total	173	4005038.305			

Requested Details for: *All Pairwise Comparisons (Tukey Correction) - Males*

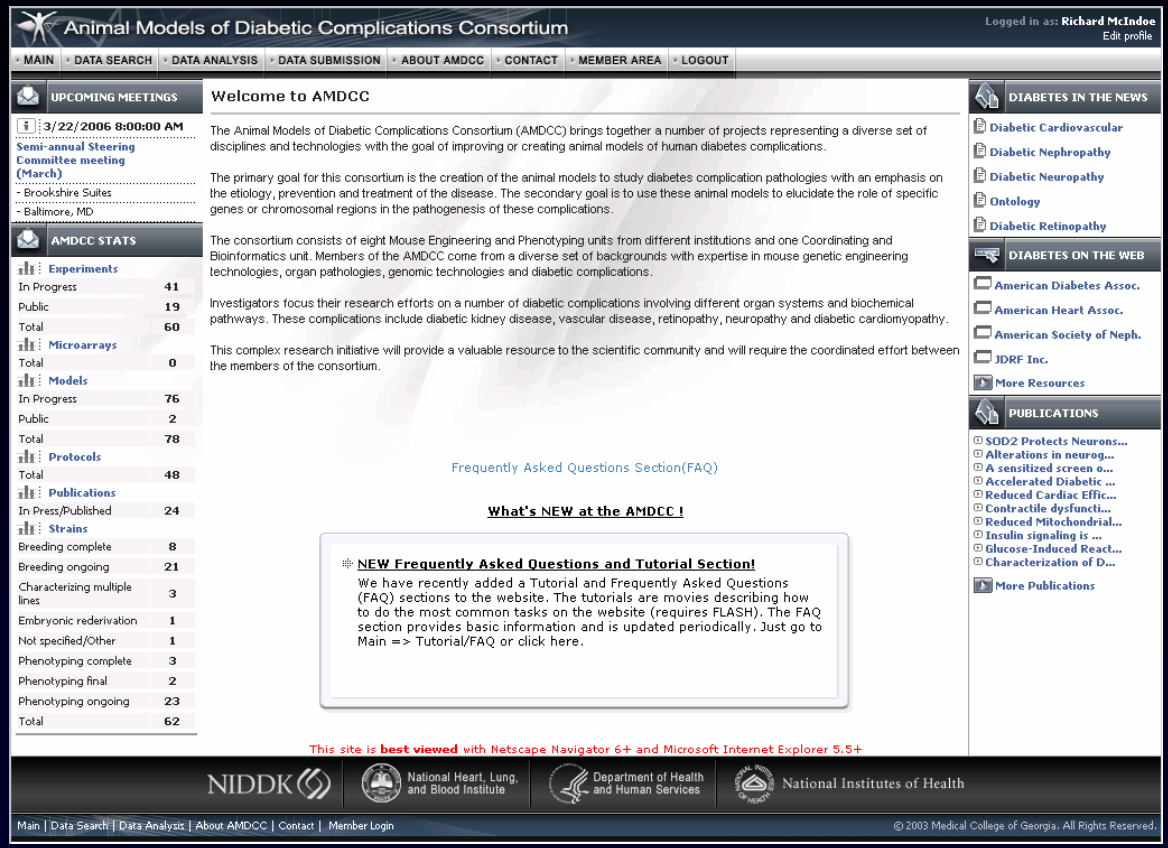
Strains | Plot Charts

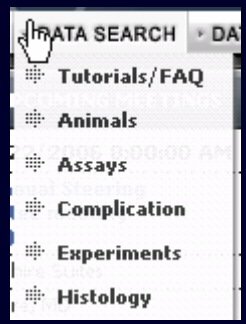
Strain 1	Strain 2	P value	Chart
129S6/SvEv	C57BL/6J	**0.00060399**	
129S6/SvEv	DBA/2J	**9.306×10^{-11}**	
C57BL/6J	DBA/2J	**0.00000016**	

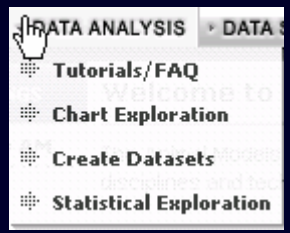
Requested Details for: *All Pairwise Comparisons (Tukey Correction) - Females*

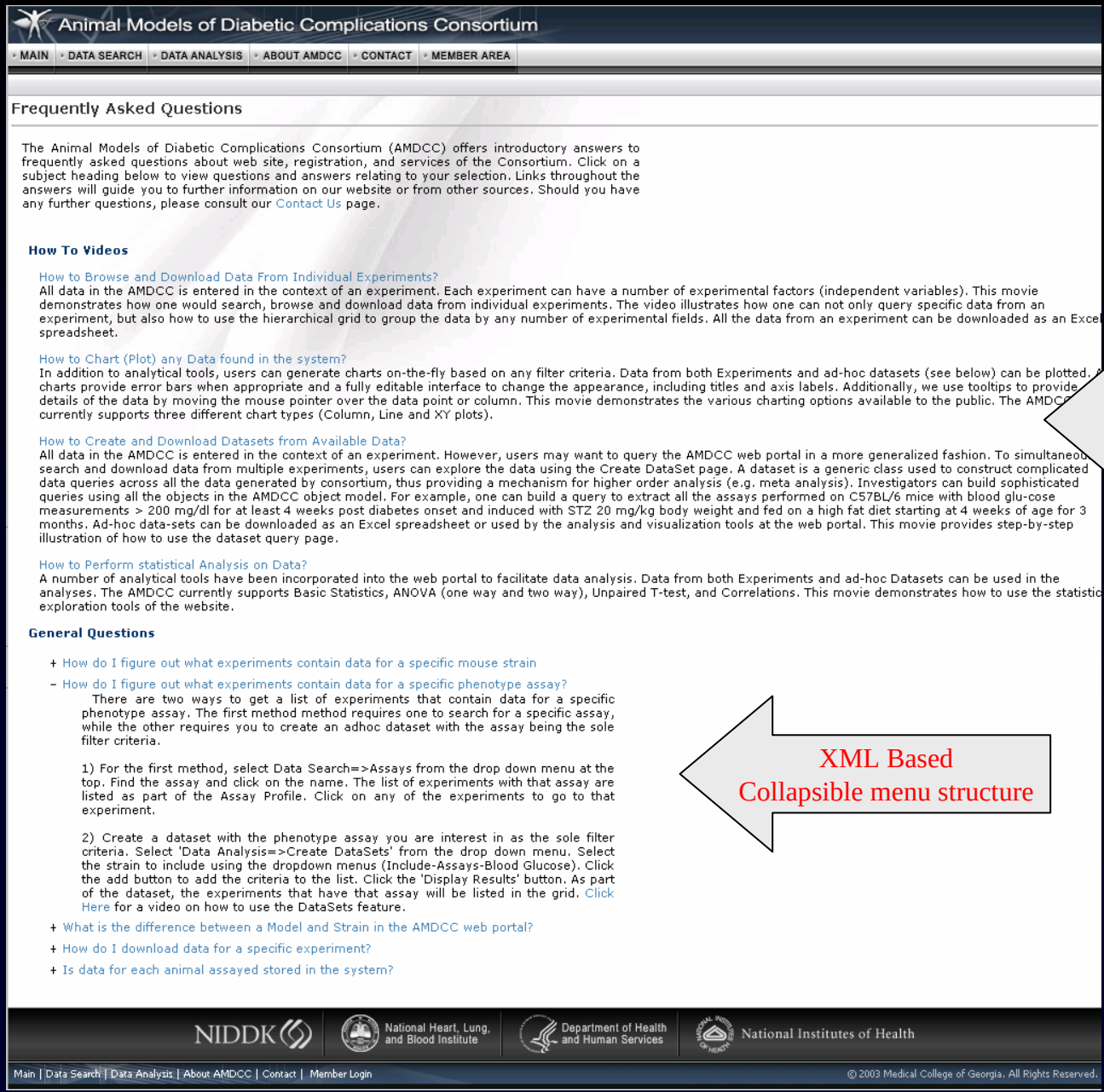
Strain 1	Strain 2	P value	Chart
129S6/SvEv	C57BL/6J	0.14218060	
129S6/SvEv	DBA/2J	**0.00004265**	
C57BL/6J	DBA/2J	0.06698436	

Completed FAQ and Training modules for public/members









Flash Based Tutorials

XML Based Collapsible menu structure

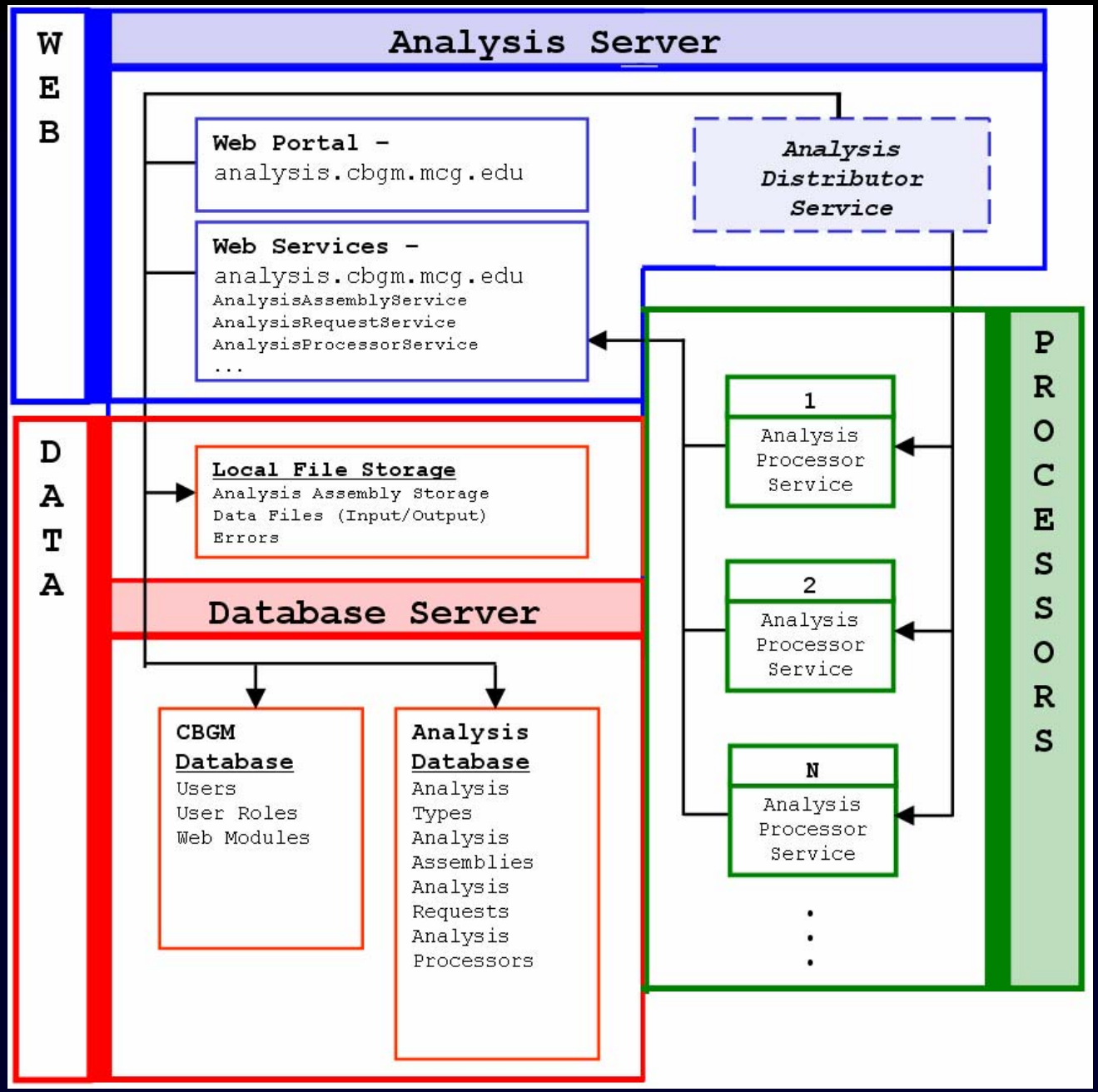
AMDCC

Completed Analysis Engine Framework

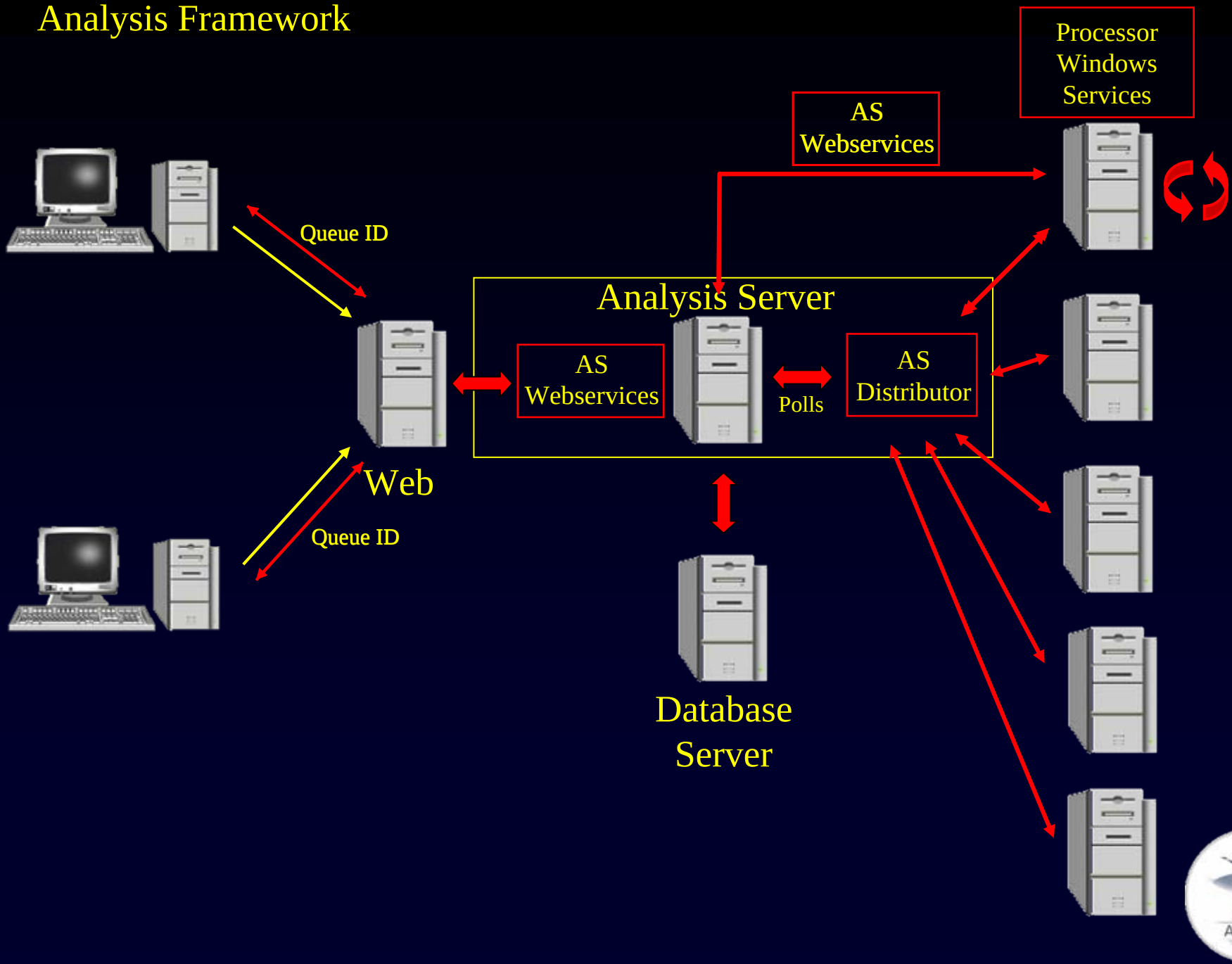
- While performing the requirements analysis for microarray analysis , it became obvious that most of the typical analytical routines that users may want to perform will require extended periods of time.

- For example, a simple hierarchical cluster of 5000 genes from 20 arrays can take a few minutes to perform. Given we are using a web based user interface, it is unrealistic to keep a connection between the client (browser) and the servers during the analysis time.

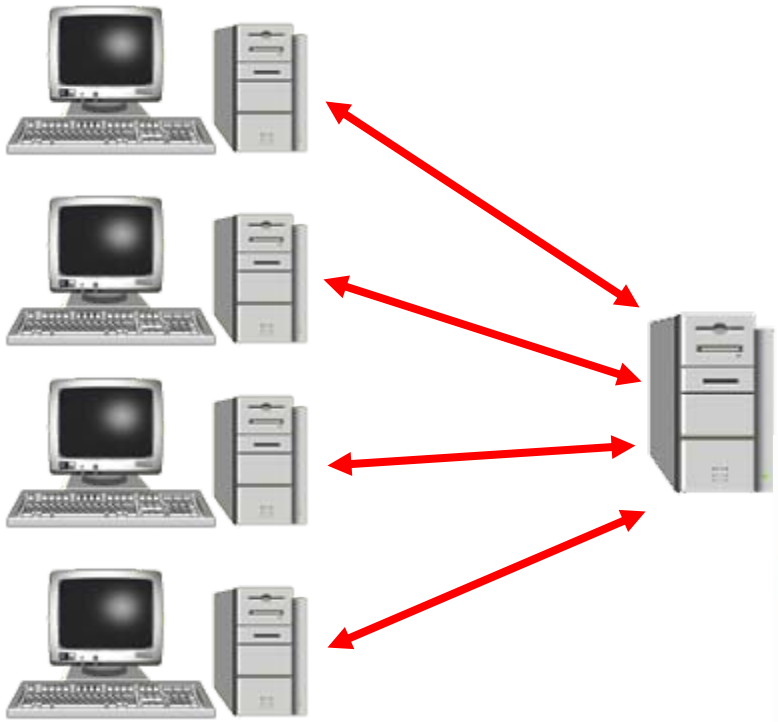
- Therefore, we developed an Analysis Engine Framework that provides the infrastructure to queue and run lengthy analysis subroutines or algorithms asynchronously using our internal compute clusters.


WEB
Analysis Server
Web Portal –
analysis.cbgm.mcg.edu
Web Services –
analysis.cbgm.mcg.edu
AnalysisAssemblyService
AnalysisRequestService
AnalysisProcessorService
...
Analysis Distributor Service
DATA
Local File Storage
Analysis Assembly Storage
Data Files (Input/Output)
Errors
Database Server
CBGM Database
Users
User Roles
Web Modules
Analysis Database
Analysis Types
Analysis Assemblies
Analysis Requests
Analysis Processors
PROCESSORS
1
Analysis Processor Service
2
Analysis Processor Service
N
Analysis Processor Service

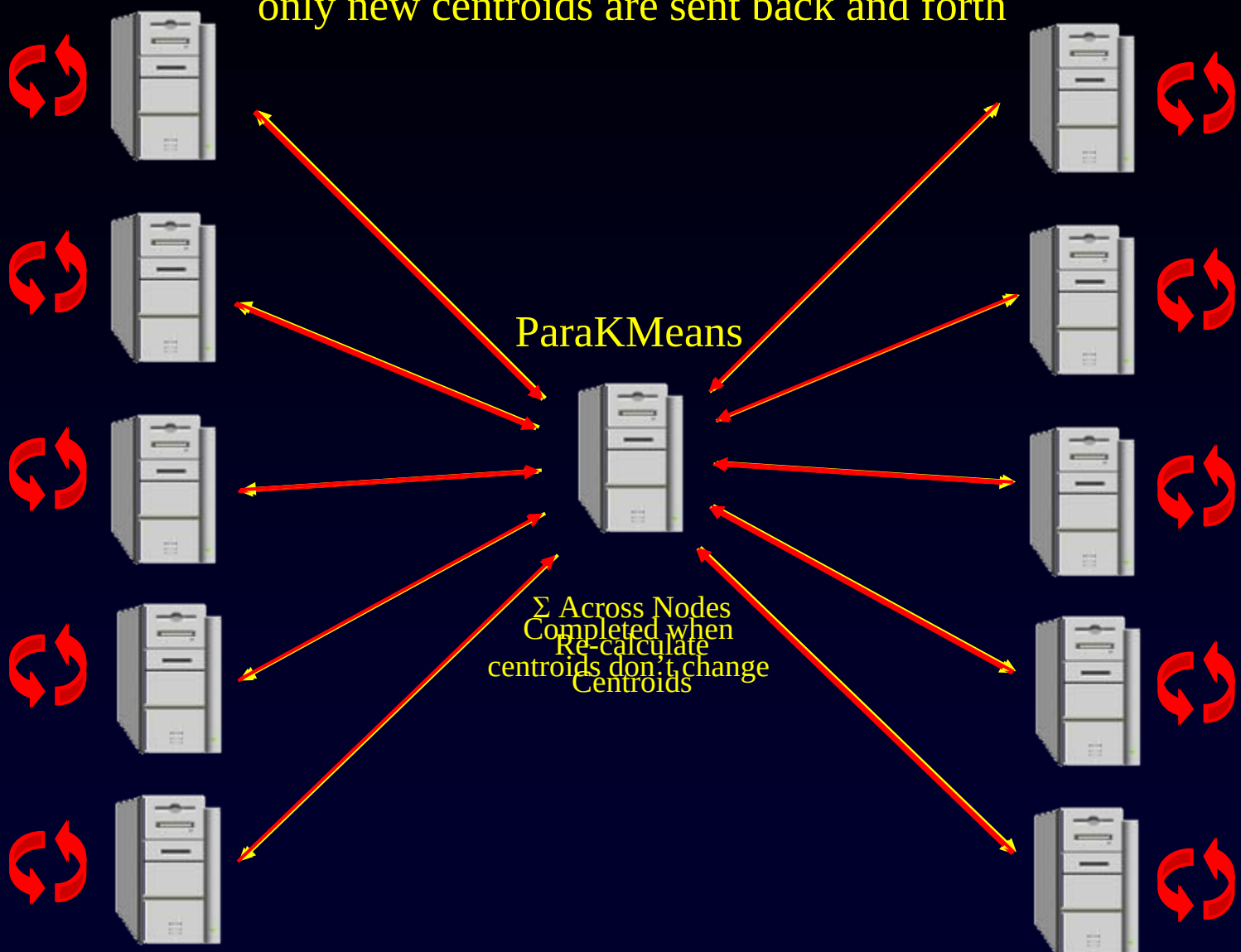
Analysis Framework



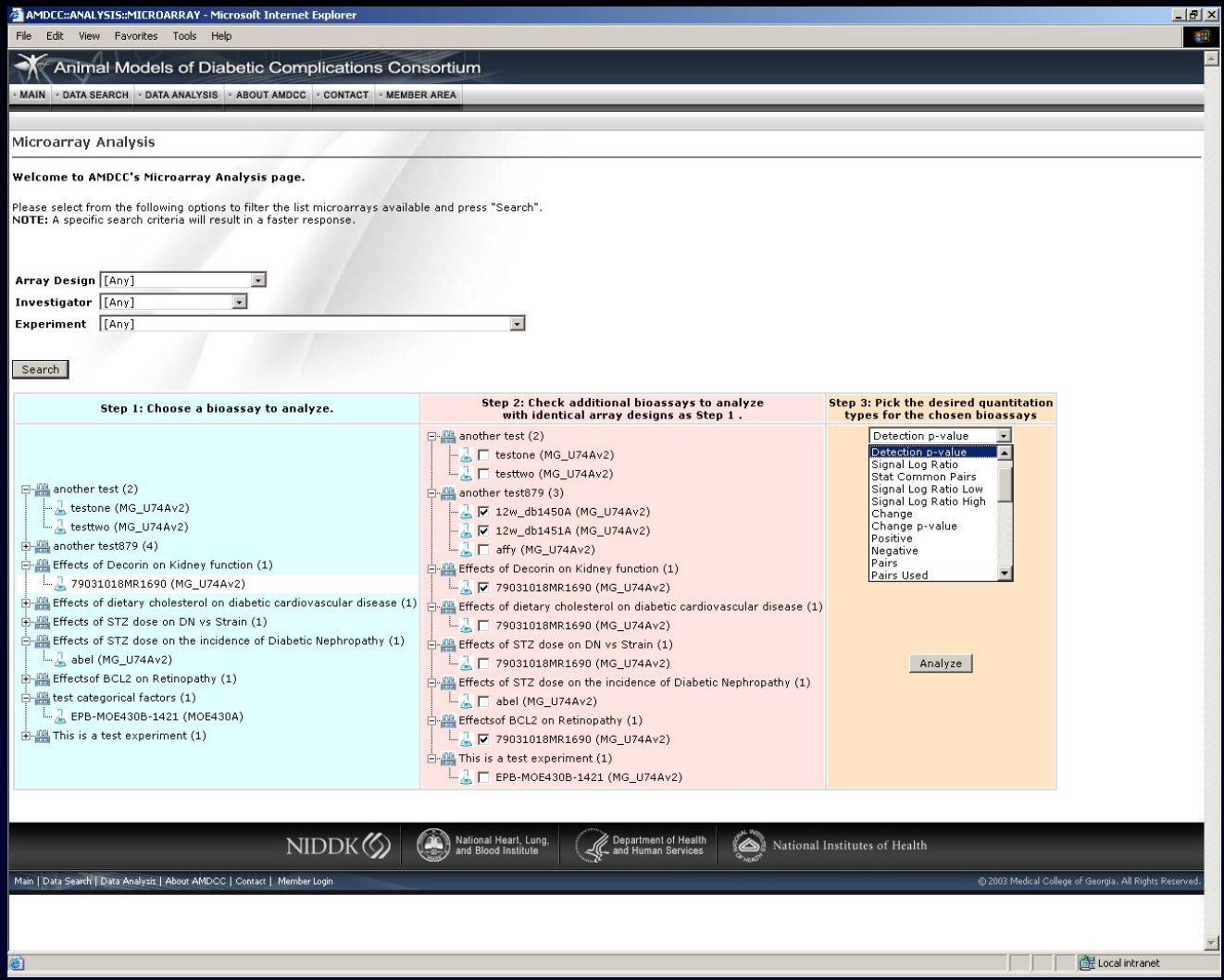
ParaKMeans



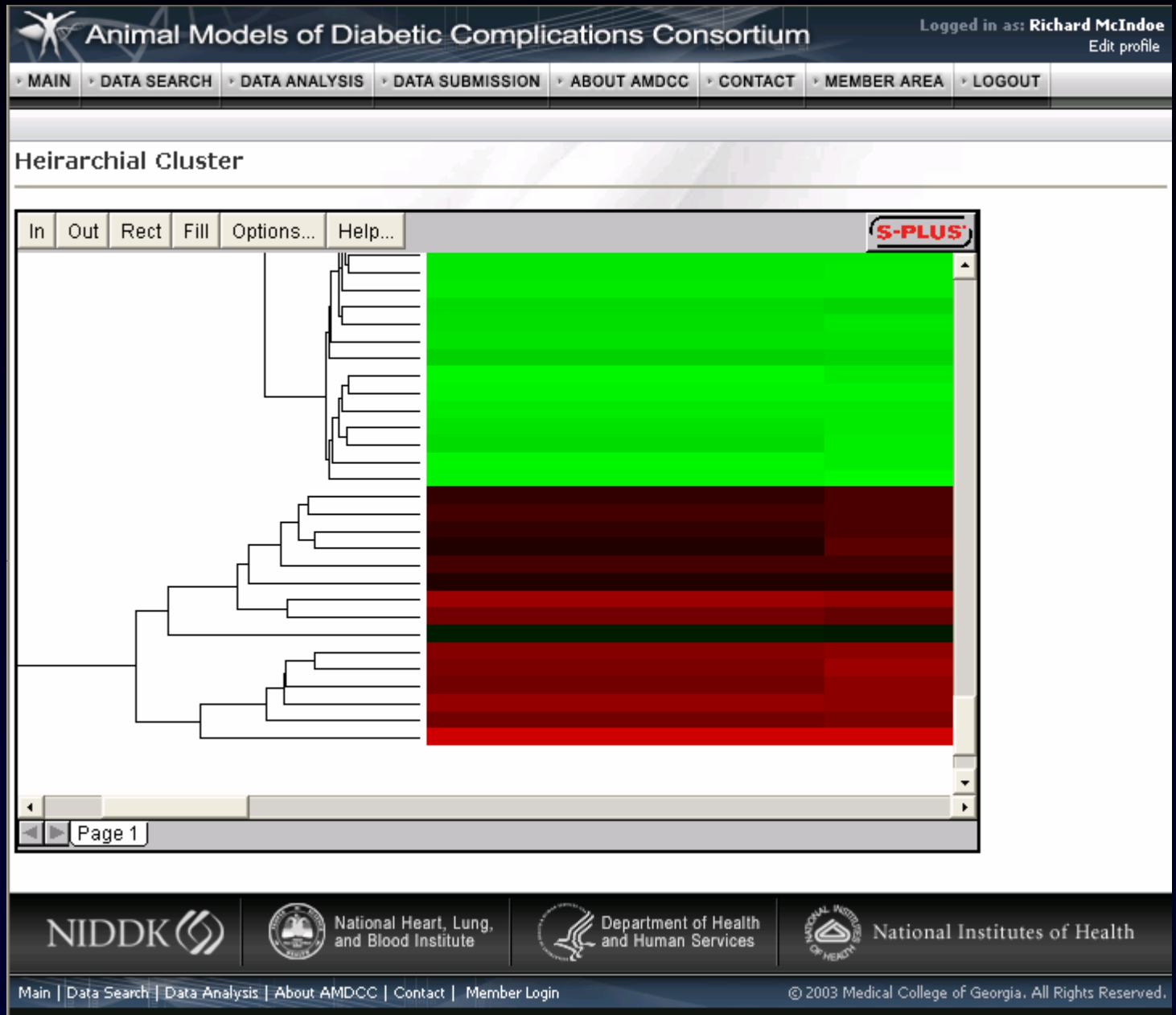
Data sent to each node and remains there, only new centroids are sent back and forth



Developing microarray user interfaces to search and retrieve data



Developing microarray modules



Future Directions

1. Work on improving microarray upload procedure
2. Work on better microarray filter based on statistics
3. Work on adding clustering, PCA, routines to web portal
4. Continue to develop and update training modules for portal

The End

If you have any problems, questions or concerns don't hesitate to email us.
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General web:
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Data, assays, experiment help:
spatel@mail.mcg.edu (Sachen Patel)

Website
vdoshi@mail.mcg.edu (Vishal Doshi)