

# From IT Troubleshooting & Service Monitoring To Predicting Student Achievement

Cam M. Johnson  
Associate Director IT Operations Center, UNLV

Matthew L. Bernacki  
Assistant Professor of Educational Psychology, UNLV

Liz Whitaker-Freitas  
Higher Ed Evangelist, Splunk

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# Student Success And Retention

- Lost immediate and potential future revenue

*(Assume 4,000 1st year students @ \$32,405/yr\*)*

- Additional **1%** retained: **\$3,888,600**
  - Cost of Recruiting: \$97,320\*\*
  - Lost Future Revenue: ??
- Performance Based Funding
  - Reputation/Rankings



\* [College Board Average Published Undergraduate Charges by Sector, 2015-16](#)

\*\* [Noel Levitz: 2013 Cost of Recruiting an Undergraduate Student Report](#)

# Student Success And Retention

- Retain and educate more students
  - Minimize lost revenues
  - Recruit the right students
  - Build lifetime relationships/giving
- Do more with less
- Proactive not Reactive



# Turning Machine Data Into Operational Intelligence



# Agenda

Log Files



Operational  
Insight



Data Science  
&  
Analytics



Innovative  
Learner  
Support

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# Background



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# UNLV IT Operations Center

Evolved from Network Development and Engineering team in 2006 to a traditional Network Operations Center.

Currently offer a wide range of services:

- Monitoring
- Log Aggregation and Search
- Data Center
- Tier 2 support



# Splunk @ UNLV Timeline

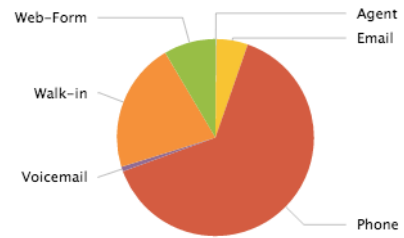


from Aug 23 through Aug 29, 20... ▾

2m ago

Tickets Received by: ▾	Total ▾
Phone	4160
Walk-in	1382
Web-Form	552
Email	337
Voicemail	51
Agent	9
<b>Total Tickets Created:</b>	<b>6491</b>

2m ago



2m ago

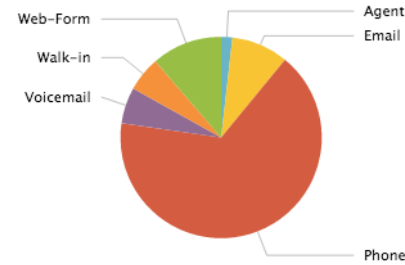
Password Reset Counts ▾	Total ▾
Active Directory ACE	4973
Wireless	331
Rebelmail	314
OTHER	124
MyUNLV	115

from Jan 17 through Jan 23, 20... ▾

2m ago

Tickets Received by: ▾	Total ▾
Phone	2274
Web-Form	388
Email	313
Voicemail	200
Walk-in	191
Agent	62
<b>Total Tickets Created:</b>	<b>3428</b>

2m ago



2m ago

Password Reset Counts ▾	Total ▾
Active Directory ACE	1335
Wireless	283
Rebelmail	271
MyUNLV	222
OTHER	82

# Project Phases

Data  
Construction



Data  
Modeling



Data Science  
&  
Analytics



Innovative  
Learner  
Support

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# Data Construction & Modeling



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# Resources For Learning

The screenshot shows the UNLV WebCampus interface. At the top, it says "UNLV WebCampus" and "MyWebCampus Resources". Below that, there's a navigation bar with "Build Content", "Assessments", "Tools", and "Partner Content". The main content area is divided into two sections. The top section is titled "Calendar" and shows a calendar for March 2015. The calendar has a "Planning" label in a red box. The bottom section is titled "Syllabus & Learning Goals" and contains two items: "Course Syllabus" with a "Planning" label in a red box, and "Math 181 Learning Goals" with a "Monitoring Progress" label in a red box.

The screenshot shows the "Chapter 1" content in UNLV WebCampus. It features a navigation bar with "Build Content", "Assessments", "Tools", and "Partner Content". The main content area is divided into several sections, each with a red label on the right: "1.1 Blank" (Lecture Notes - Partial), "1.1 Complete" (Lecture Notes - Complete), "WebAssign (WA) 1.1" (Assignment), "Quizzes & Solutions" (Assignment Solution), "Extra Chapter Quizzes and Solutions (for Self-Assessment)" (Monitoring Learning), "My Grades" (Monitoring Performance), and "Learning Assistant" (Monitoring Process). Each section includes a brief description and a "Discover Content" link.

# Data Logging & Enrichment

- Use Splunk to grab key terms, organize it into tables; add lookup tables to enrich with meaningful information

The screenshot shows the Splunk web interface for the 'Learning TAGS' application. A search query is entered in the search bar, and the results are displayed in a table. The search query is:

```
index="webcampus_application" source=/usr/local/blackboard/apps/tomcat/* AND (course_id=_33760_1 OR course_id=_33286_1 OR course_id=_33764_1 OR course_id=_33284_1 OR course_id=_33285_1 OR course_id=_28785_1 OR course_id=_28789_1) content_id=*  
| lookup tagsCourseGAPI course_id AS course_id content_id as content_id OUTPUT forum_id, tool_id, content_name, content_type, resource_type, anchor_day  
| eval Time=strftime(_time, "%m/%d/%Y %H:%M:%S")  
| table Time course_id Ltags_course_name Ltags_course_number Ltags_course_section semester content_id tool_id forum_id content_name content_type resource_type toc_id request session_id semester_day semester_week duid USER_ID, anchor_day semester_name semester_date  
| rename tool_id as Ltags_tool_id, forum_id as Ltags_forum_id, content_name as Ltags_content_name, content_type as Ltags_content_type, resource_type as Ltags_resource_type
```

The search results show 48,899 of 185,192 events matched. The table below displays the first three rows of results, with columns highlighted in red:

Time	course_id	Ltags_course_name	Ltags_course_number	Ltags_course_section	semester	content_id	Ltags_tool_id	Ltags_forum_id	Ltags_content_name	Ltags_contentType
08/01/2014 10:26:19	_33760_1	MATH	181	1001	Fall 2014	_757485_1				
08/01/2014 10:23:51	_33760_1	MATH	181	1001	Fall 2014	_753985_1	NULL	NULL	Learning Assistant (course menu link)	Content area that holds assessment (course menu link)
08/01/2014 14:50:41	_33760_1	MATH	181	1001	Fall 2014	_753985_1	NULL	NULL	Learning Assistant (course menu link)	Content area that holds assessment

# Data Logging & Enrichment

- Restructure using PIVOT in Splunk it to represent *learning events*, based on the content students utilize

49,028 of 64,495 events matched

Filters: from Aug 21, 201... +

Split Rows: duid +

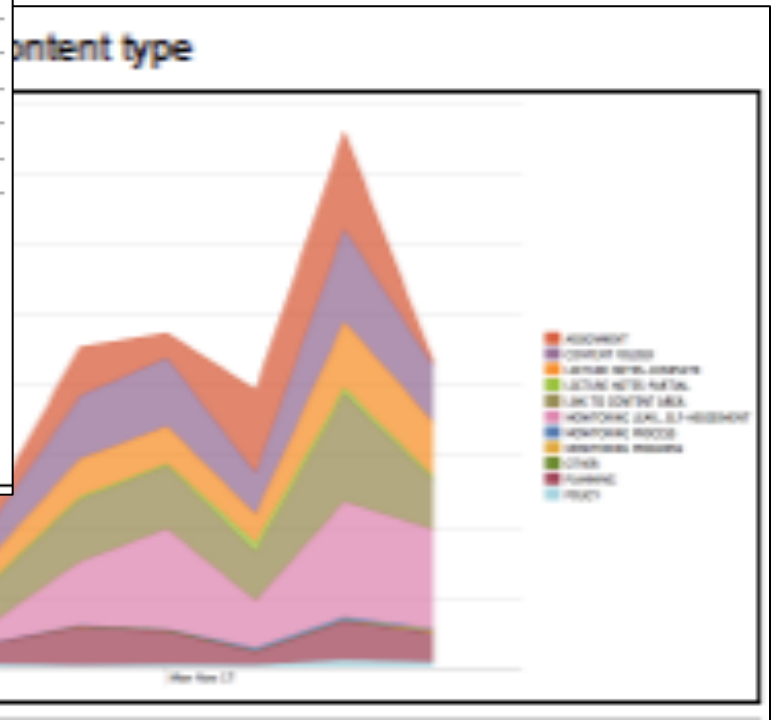
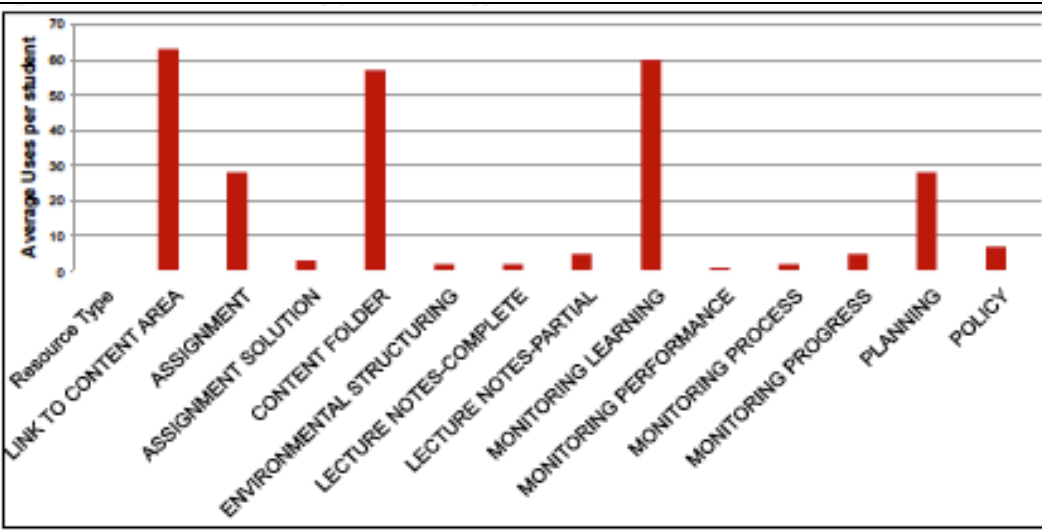
Split Columns: semester\_week, Ltags\_resource\_ty... +

Column Values: Count of learning... +

duid	ASSIGNMENT	COMMUNICATION TOOL	CONTENT FOLDER	ENVIRONMENTAL STRUCTURE	ENVIRONMENTAL STRUCTURE	LECTURE NOTES-COMplete	LECTURE NOTES-PARTIAL	LINK TO CONTENT AREA	LINK TO EXTERNAL WEBSITE	MONITORING LEARNING / SELF-ASSESSMENT	MONITORING PERFORMANCE
-	3	0	0	0	0	0	0	0	0	0	0
_10!	0	0	0	0	0	0	0	0	0	0	0
_10!	0	0	2	0	1	0	0	3	0	0	0
_10!	0	0	0	0	0	0	0	1	0	0	0
_10!	0	0	0	0	0	0	0	0	0	0	0
_10!	0	0	1	0	0	2	0	5	0	0	0
_10!	0	0	0	0	0	0	0	1	0	0	0
_10!	0	0	0	0	0	0	0	2	0	0	0
_10!	0	0	1	0	0	0	0	2	0	0	0

20 per page | Format | < Prev 1 2 3 4 5 Next >

# Data Modeling & Analytics





# Data Science & Student Support

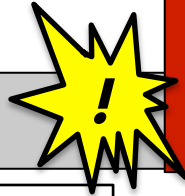


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# SEMESTER

## Week



EXAM 1

EXAM 2

EXAM 3

EXAM 4

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

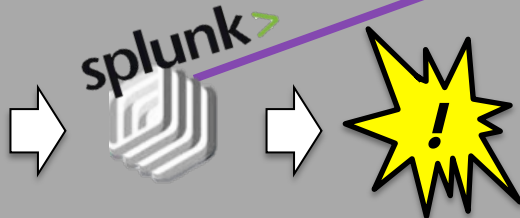
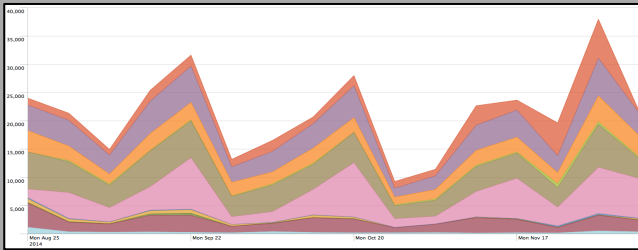


85% accuracy IDing "C or worse" earners  
100s receive early alert messages

Prediction Modeling tools available in Splunk 6.4



Log. Model. Apply. Predict. Alert.



### Predictor

B

splunk> App: Learning TAGS Settings Activity Help Find

Search splunk> listen to your data Reports Learning TAGS

Normal All-In-One Weights Edit More Info Add to Dashboard

Calculates the final weights (weekly/total counts and

All time

✓ 47,418 events (before 7/7/16 12:17:24.000 PM) Job

582 results 10 per page < Prev 1 2 3 4 5 6 7 8 9 ... Next >

duid	email	course	weight
._1044_1	SEDANOA2@UNL	_33286_1	0.0171
._10492_1	SCHOMIG@UNLV	_33284_1	-0.4343
._10541_1	JAVANMAR@UNL	_33284_1	-0.3243
._10895_1	DIFUNTO4@UNLV	_33285_1	-0.3575
._10923_1	NORMANB3@UNI	_33284_1	-1.5623
._10925_1	PEREZW6@UNLV	_33285_1	-0.6005
._10949_1	MOLLN@UNLV.NE	_33284_1	-1.3129
._10951_1	PANTALE7@UNLV	_33285_1	0.8674
._11189_1	CONDONB3@UNL	_33284_1	-0.9490
._11269_1	LAMBROPO@UNI	_33285_1	-0.4208

https://splunk.oit.univ.edu/en-US

# An Early Warning, Or “A Check-in On Your Learning”



Hi [Name]!

Our first course exam is coming up in a week or so.

[I'm a little concerned that you might not score so well because of the way you've been using the resources provided on WebCampus so far this semester.]

I want to check-in to make sure each student is on top of our content, learning in appropriate ways, and able to perform well. So, I'd like to direct you to **two** resources that can help you with learning the material in our course:

1. The first is a one-page summary of advice from students who earned As & Bs in the course.
2. A set of learning modules called "The Science of Learning to Learn."  
These modules describe learning strategies you can use with our course materials...

Both resources can be found on the WebCampus site for our course under the **STEM Learning Resources** link in the left panel (and provided in this announcement, below).

I hope you find that these resources help you to learn and perform well!

Dr. Utz

# Innovative Learner Support

## Student Advice

### Tackling Anatomy & Physiology at UNLV

Advice from successful past students:

What helped them learn and score well in Anatomy & Physiology?

We asked UNLV students to reflect on their experience learning in anatomy and physiology courses. What helped them do well? And what didn't?

See what they had to say!



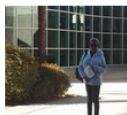
Britney

**“Plan ahead! Seek out materials early on, make a study plan, and stick to it.”**

There's definitely a learning curve in A&P, so it's good to get advice from past students. I personally would recommend that students seek out any helpful materials in the beginning of the course, make a plan on how to use them, and stick to the plan. Courses like anatomy require a lot of memorization, so it is very important to repeatedly try to recall the information. For example, if you need to learn to label something, erase labels, print it out, and then practice labeling it. Certainly read the textbook, but then also look to the learning objectives and the materials the instructor provides and plan from there – there are usually online tools like practice quizzes to help you study. Of course, studying the last minute is the biggest mistake. Definitely space out when you study and make sure to never get behind. I think that a lot of students fail this class because they just cram before the test and then have a very hard time during finals.

**“I learned tough concepts best when I explained them out loud to myself and to others.”**

This class was hard, but I did manage to earn a B. For me, the first trick was to not procrastinate. I reviewed the material on a daily basis so that when a test got closer, all I had to do was review. This also gave me time to ask the teacher questions during office hours.



## Skill Training (Science of Learning to Learn)

### The Science of Learning to Learn



Welcome to *the Science of Learning to Learn!*

Are you having trouble achieving grades you want?

Is studying taking too much of your time?

Do you soon forget what you studied?

Students often choose learning and studying methods that are familiar to them, but aren't the ones that produce the best results.

**Emily's dilemma**

In her chemistry class, Emily was told she would have a test in three weeks. Emily wrote the date down in her calendar to work. She worked very hard, using all the strategies she had successfully used in high school: she spent hours of thought to be important. She worked deep into the night both Wednesday and Thursday and arrived exhausted by Friday.

On Monday, Emily returned to Chemistry class and received her graded exam. Despite her intense effort, the C+ grade was not what she needed.

# Epilogue: Student Benefits

**The Need:** 50% of students who who take BIOL 223 have to retake it

**The Benefits:** 305 received messages in our project

*Next Exam:* **108** who received messages (IDed “C or worse”) earned **As & Bs**

**The Challenge:** “science of messaging” isn’t perfect yet...

Do alerts always help?

Personalizing the message (Hi So-and-so!) seems to help.

**The Promise:**

100s of students received data-driven feedback in Biology so far.

1000s more in Calculus, Algebra and Engineering will this year!

*Next year..?*

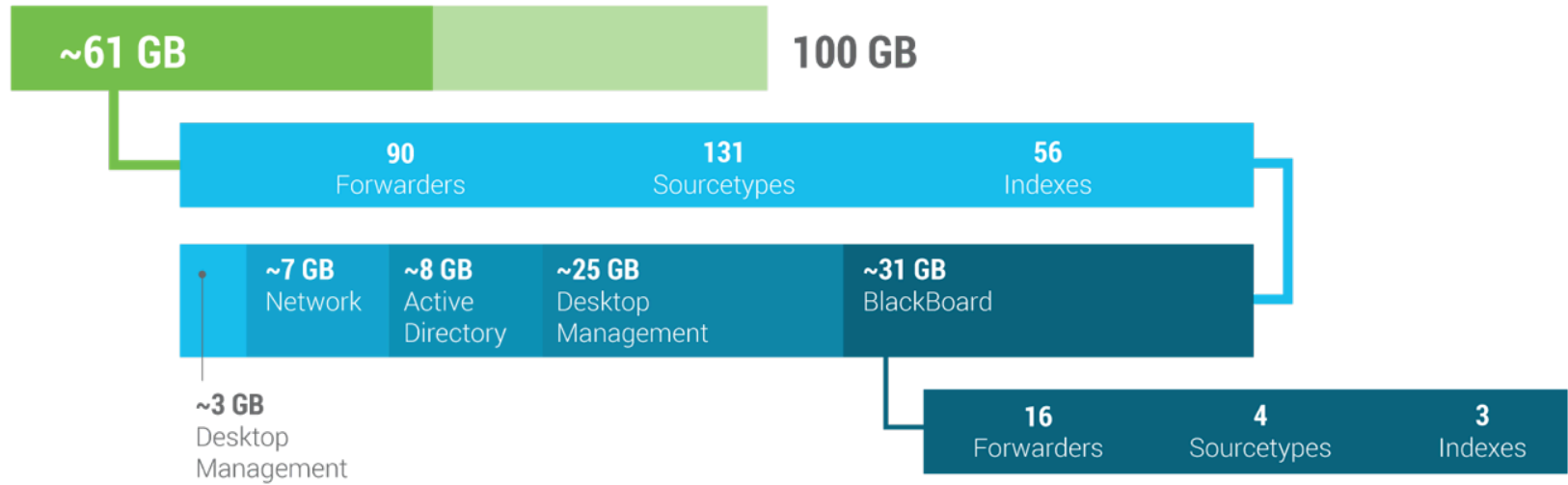
# Supporting Research



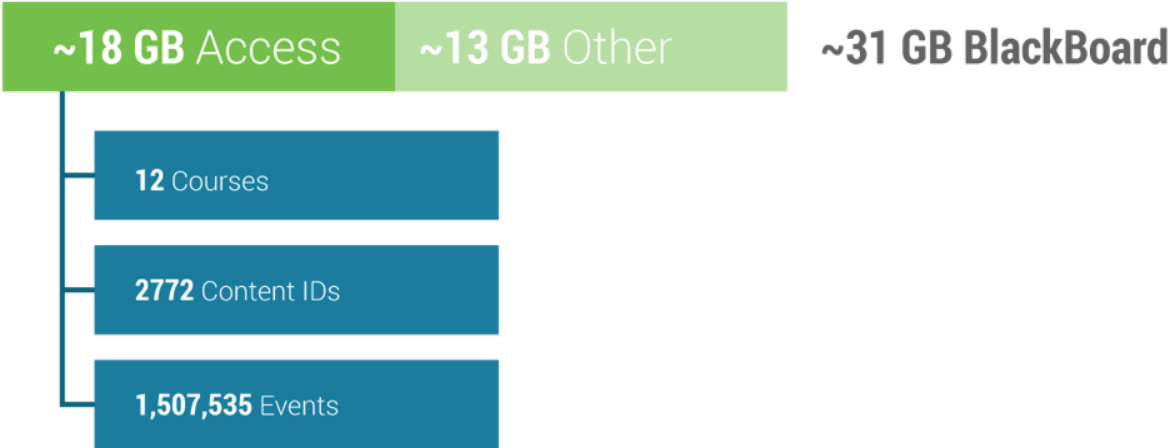
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# UNLV Splunk Environment

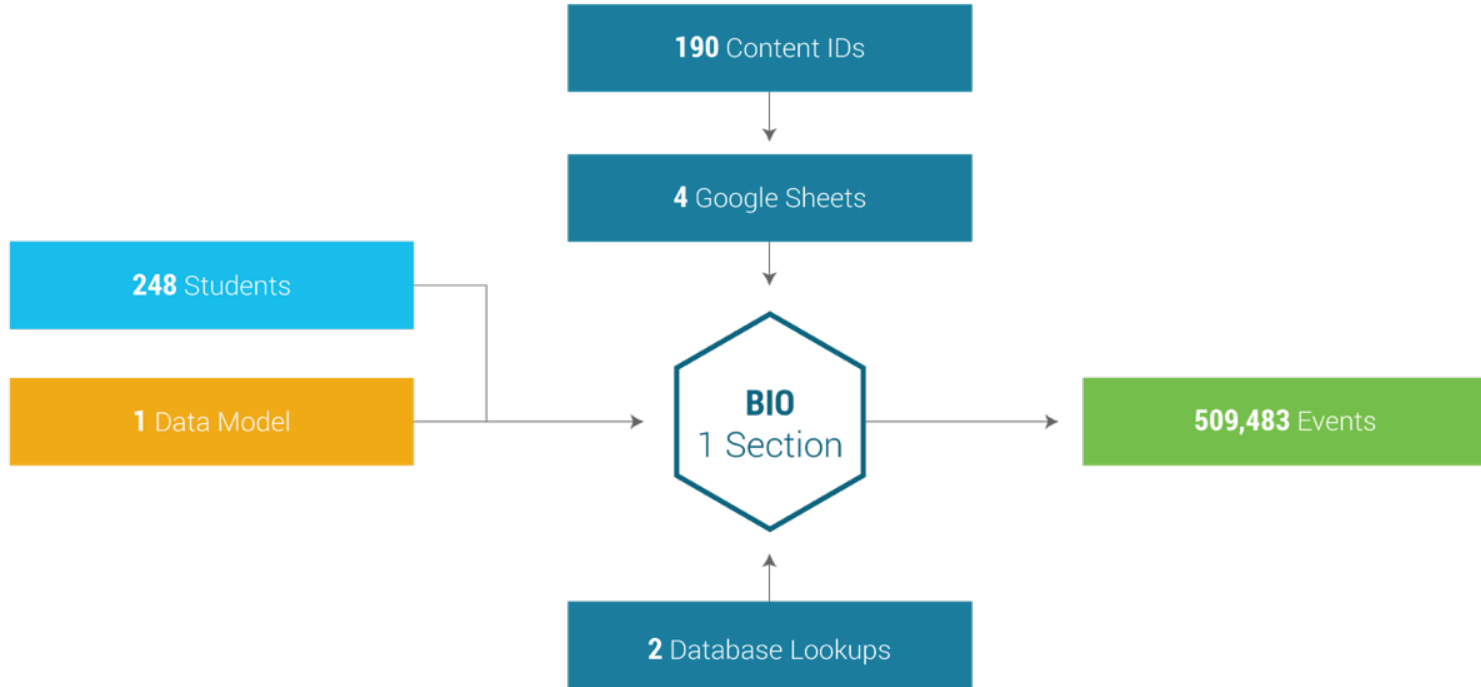


# BlackBoard





# Course Details



# UNLV IT Benefits

- Broadened our understanding of the LMS environment
- Created indexing opportunities
  - Student Information System
  - Identity Management
- Validated everything we've done since 2010
  - For some, a solution outside of IT heightened Splunk's standing
  - Pride amongst the Splunk team

### Note posted for user

<1m ago

Date	Author	Status	Username	Description
04/18/2016	Cyndi	please forward incoming requests to Cyndi Backstrom.	Cyndi	Working with user on-going issue of accessing application

### Footprints issues updated within past 7 days

<1m ago

Last Update	Issue	Title	Status	Customer	NSHE	Username	Employee	Student	Main Category	Service Category	Sub Category
username not found											

### WebCampus login activity

<1m ago


Time	IP	Event Name	Node	DUID	First Name	Last Name	Username	ISP Name	OS	Browser (version)	City	Region	Country
2016-07-28 08:07:02 AM	10.248.49.167	Successful Login	oit-wcl-papp-03	_10910_1	Robert	Coe	coer	Internal Wired IP	Windows	Chrome (51)	Las Vegas	Nevada	United States
2016-07-28 07:59:56 AM	10.248.49.167	Successful Login	oit-wcl-papp-03	_10910_1	Robert	Coe	coer	Internal Wired IP	Windows	Chrome (51)	Las Vegas	Nevada	United States
2016-07-21	Null	Session Expiration	oit-wcl-papp-03	_10910_1	Robert	Coe	coer	Null					

### Enrollment Information - Updated daily at 3:24 AM

<1m ago

Username	Course Name	Year	Semester	Available	Role	Enrollment last updated
coer	STAT 411 1003 - 2016 Sprg	2016	Sprg	Yes	Student	2015-12-23 11:57:30 AM
coer	STAT 411 1001 - 2016 Sprg	2016	Sprg	Yes	Student	2015-12-23 11:57:27 AM
coer	BIOL 197 1003-1018 - 2016 Sprg			Yes	Student	2015-12-23 11:55:42 AM
coer	BIOL 197 1015 - 2016 Sprg	2016	Sprg	Yes	Student	2015-12-23 11:55:42 AM
coer	BIOL 197 1002 - 2016 Sprg	2016	Sprg	Yes	Student	2015-12-23 11:49:13 AM
coer	CS 489 1003 - 2016 Sprg	2016	Sprg	Yes	Student	2015-12-23 11:01:36 AM
coer	CS489_CS689_Section 3 - 2016 Sprg			Yes	Student	2015-12-23 11:01:36 AM
coer	CS 473 1001 - 2016 Sprg	2016	Sprg	Yes	Student	2015-12-23 11:00:49 AM
coer	CS473_673 - 2016 Sprg			Yes	Student	2015-12-23 11:00:49 AM
coer	CS 460 1001 - 2016 Sprg	2016	Sprg	Yes	Student	2015-12-23 10:59:51 AM

# Content Activity

Edit ▾ More Info ▾  

Username

course\_id

Content Type

- content\_id
- forum\_id
- blog\_id

Last 60 minutes ▾

Submit

<1m ago									
_time	duid	USER_ID	course_id	COURSE_NAME	content_id	forum_id	blog_id	TITLE	HTTP
2016-07-28 10:35:33	_13426_1	collinik	_80897_1	PHIL 102 1014 - 2016 Sumr	_2283729_1			Module Three Homework	"POST /webp
2016-07-28 10:35:13	_13426_1	collinik	_80897_1	PHIL 102 1014 - 2016 Sumr	_2283729_1			Module Three Homework	"POST /webp
2016-07-28 10:35:12	_13426_1	collinik	_80897_1	PHIL 102 1014 - 2016 Sumr	_2283729_1			Module Three Homework	"GET /webap
2016-07-28 10:35:12	_13426_1	collinik	_80897_1	PHIL 102 1014 - 2016 Sumr	_2283729_1			Module Three Homework	"POST /webp
2016-07-28 10:35:07	_11430_1	odiorne2	_80274_1	SW 785 1002 - 2016 Sumr		_259867_1		Welcome to WebCT	"GET /webap HTTP/1.1"
2016-07-28 10:35:07	_11430_1	odiorne2	_80274_1	SW 785 1002 - 2016 Sumr		_259867_1		Welcome to WebCT	"GET /webap
2016-07-28 10:35:07	_13426_1	collinik	_80897_1	PHIL 102 1014 - 2016 Sumr	_2283729_1			Module Three Homework	"POST /webp
2016-07-28 10:35:27	_168057_1	ruizm5	_80014_1	CRJ 302 1002 - 2016 Sumr	_2292849_1			Interactive Activity 35	"GET /webap
2016-07-28 10:35:25	_168057_1	ruizm5	_80014_1	CRJ 302 1002 - 2016 Sumr	_2292849_1			Interactive Activity 35	"POST /webp
2016-07-28 10:35:19	_168057_1	ruizm5	_80014_1	CRJ 302 1002 - 2016 Sumr	_2292849_1			Interactive Activity 35	"POST /webp
2016-07-28 10:35:15	_33329_1	rubiod1	_80029_1	CRJ 460* 1001 - 2016 Sumr	_2288285_1			Lecture 7 - Proactive Policing	"GET /webap

# UNLV IT Solution Realizations

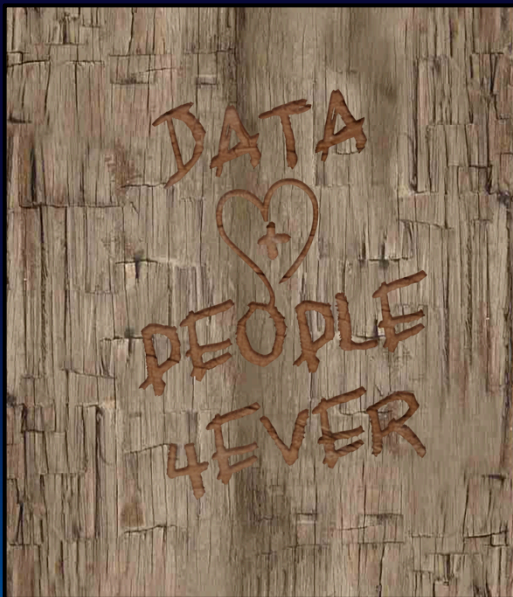
- Relationships matter
- Identifying roles is important
- Proud of our vanilla solution

# What's Next

- Institutional data onboarding from Decision Support Group
- Grow team
- Scale the solution for other departments on campus
- Presidential debate



# THANK YOU



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