

An Enterprise as Nimble as a Fighter Jet

Building the Instrumented Enterprise at Lockheed Martin

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Date | Washington, DC

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Introduction

- ▶ What is an instrumented enterprise?
- ▶ How we started out
- ▶ Hurdles to Implementation
- ▶ Building the Instrumented Enterprise
- ▶ Digital Transformation

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130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15LAF10ADFF10 HTTP/1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-5W-01"
128.241.220.82 - - [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D35L7FF6ADFF0 HTTP/1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=K0-CU-01"
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What is an Instrumented Enterprise?



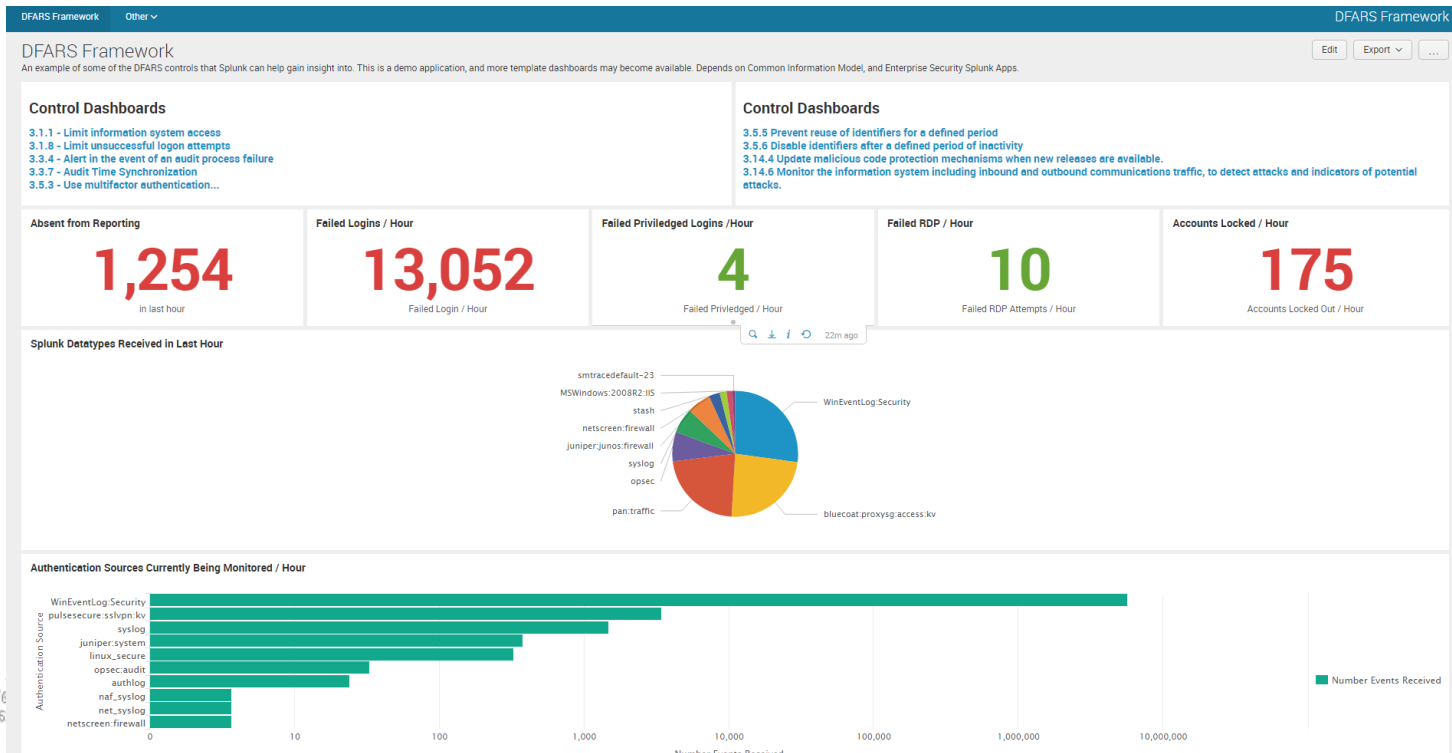
SPAD VII (single logs)



Modern Aircraft (Splunk >)

Then Came DFARS

- ▶ Systems with Defense Information had to be logged
- ▶ Data from logging started being useful in other areas
- ▶ Lockheed Martin Security became interested



Splunk logging and reporting became the choice for DFARS compliance

Lockheed Martin CIRT

- ▶ World Famous Lockheed Martin Computer Incident Response Team (CIRT)
- ▶ Cyber Kill Chain
- ▶ Laika Boss
- ▶ International Reputation as a Security Thought Leader

What could Splunk do to support top gun security?



Splunk and Expanding the Knowledge Base

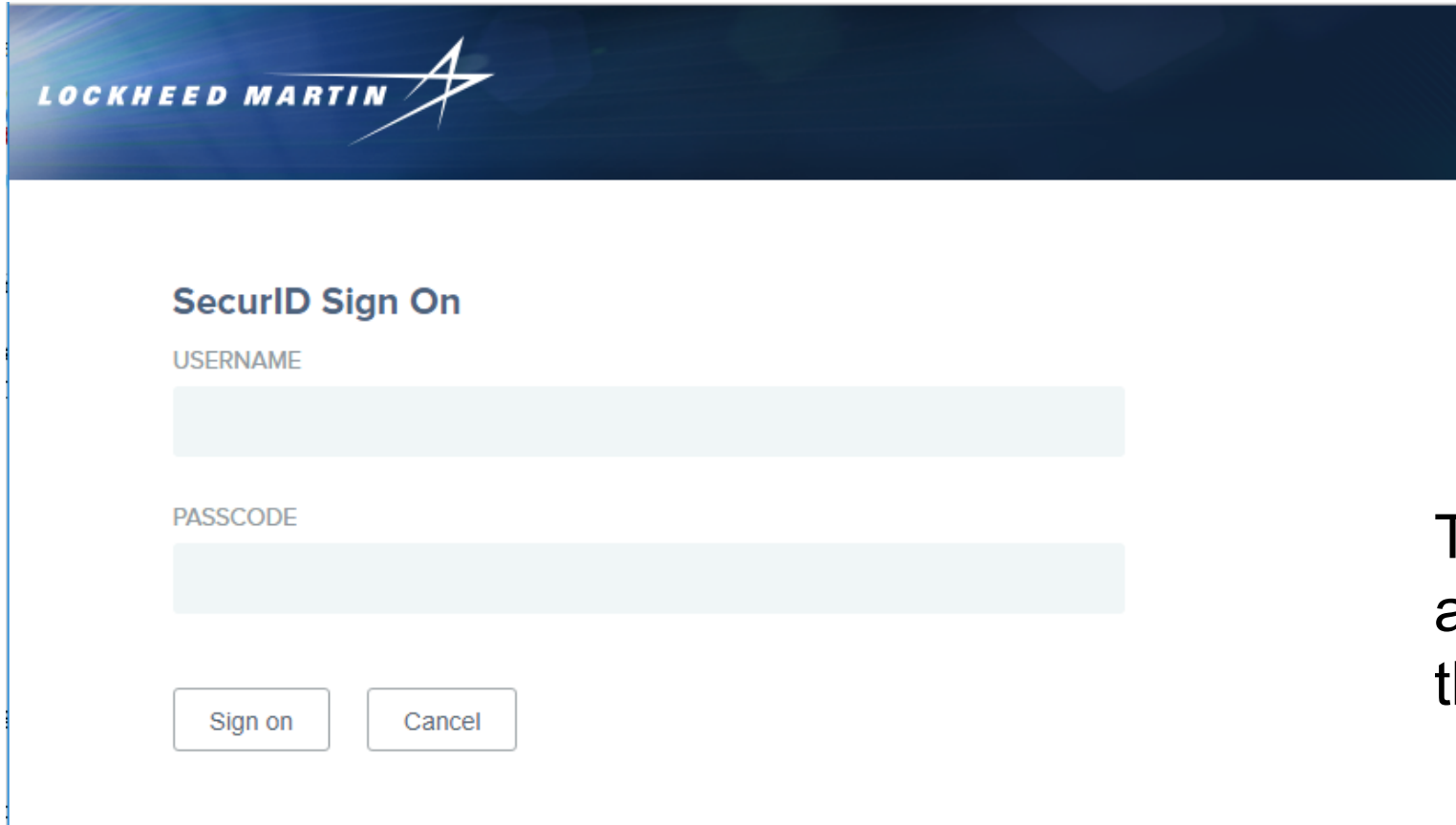
- ▶ Greater breadth of insight from broader range of collection
- ▶ More data points, more data correlation
- ▶ Splunk and CIRT tools side by side, greater insight
 - FISMA App
 - Machine Learning Tool Kit
 - Apps from Splunkbase
 - Home Grown Apps
- ▶ Splunk ES (under construction)
- ▶ **Splunk as a force multiplier**

130.60.4 - - [07/Jan 18:10:57:123] "GET /category.screen?category_id=GIFTS&JSESSIONID=SD1SLAFF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-5W-03" "Mozilla/5.0 (Macintosh; Intel Mac OS X 11_0_0; rv:54.0) Gecko/20100801 Firefox/54.0" [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=SD3SL7FF6ADFF0 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=KQ-CB-01" "Mozilla/5.0 (Macintosh; Intel Mac OS X 11_0_0; rv:54.0) Gecko/20100801 Firefox/54.0" [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=SD5SL9FF1ADFF3 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=SD5SL7FF6ADFF0" "Mozilla/5.0 (Macintosh; Intel Mac OS X 11_0_0; rv:54.0) Gecko/20100801 Firefox/54.0" [07/Jan 18:10:57:189] "GET /category.screen?category_id=FLOWERS&JSESSIONID=SD5SL7FF6ADFF0 HTTP 1.1" 200 3865 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-14&product_id=LI-02" "Mozilla/5.0 (Macintosh; Intel Mac OS X 11_0_0; rv:54.0) Gecko/20100801 Firefox/54.0"

Organizational Issues

- ▶ Who pays for what?
- ▶ Who owns the data?
- ▶ Who controls access to Indexes?
- ▶ Who decides?

Two Factor Authentication



Two Factor authentication to access the search heads



Who pays for what?

► Several Options

- Use charge back system (cumbersome overhead)
- Use licensing pools (distribute the per day license overrun risks)
- Limit usage (innovation killer)

► Use per-seat tax

- Providing IT services on a per seat basis (email, network, office applications, etc.)
- Encourages “citizen data scientists”
- Control data ingest at the Splunk administrator level

► Unlimited License

- True up at end of the year (budget uncertainty, but encourages innovation)



Who owns the data?

- ▶ Splunk service owner ultimately owns all indexes and data
- ▶ Data generators, i.e. network, server, manufacturing, etc. co-own their data
- ▶ Bigger question: What data do you want in Splunk?
 - What kinds of knowledge do you need from your data
 - What kinds of data will provide that kind of knowledge
 - How much is needed to be ingested? All of it? Extracts? Parts of the logs?
- ▶ Requires finesse between data generators and Splunk administrators to balance cost and benefits, remembering that what is not collected is lost.



Who controls access to Indexes?

- ▶ Privacy concerns
- ▶ Security data
- ▶ Proprietary data
- ▶ Control by Indexes
 - Create user roles and access to indexes
 - Some roles may need access to all indexes (Security)
 - Other roles can be limited (just network, just manufacturing, etc.)
 - What indexes can your Apps see/use?
- ▶ Good Index, data, and knowledge object management helps control costs, indexing/search performance, etc.



Splunking the Enterprise

► AWS (Government)

- Splunk for AWS to manage our cloud infrastructure
- Splunk is also on AWS
- Used the AWS App and Splunk to look for ethereal machines and compliance

► Network

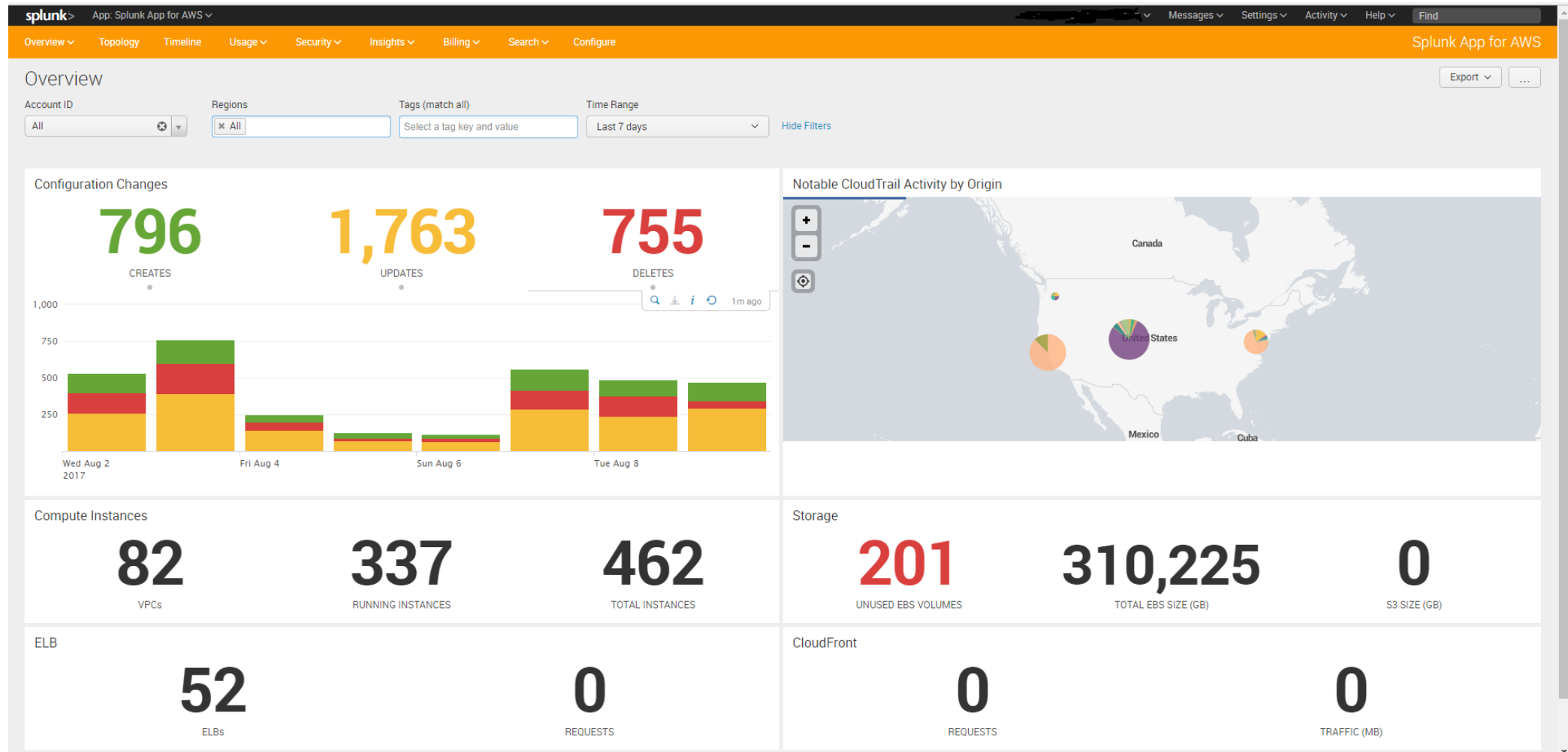
- Manage network traffic and operations
- Significant savings from mean-time to resolution, efficient use of resources, etc.

► ITSI

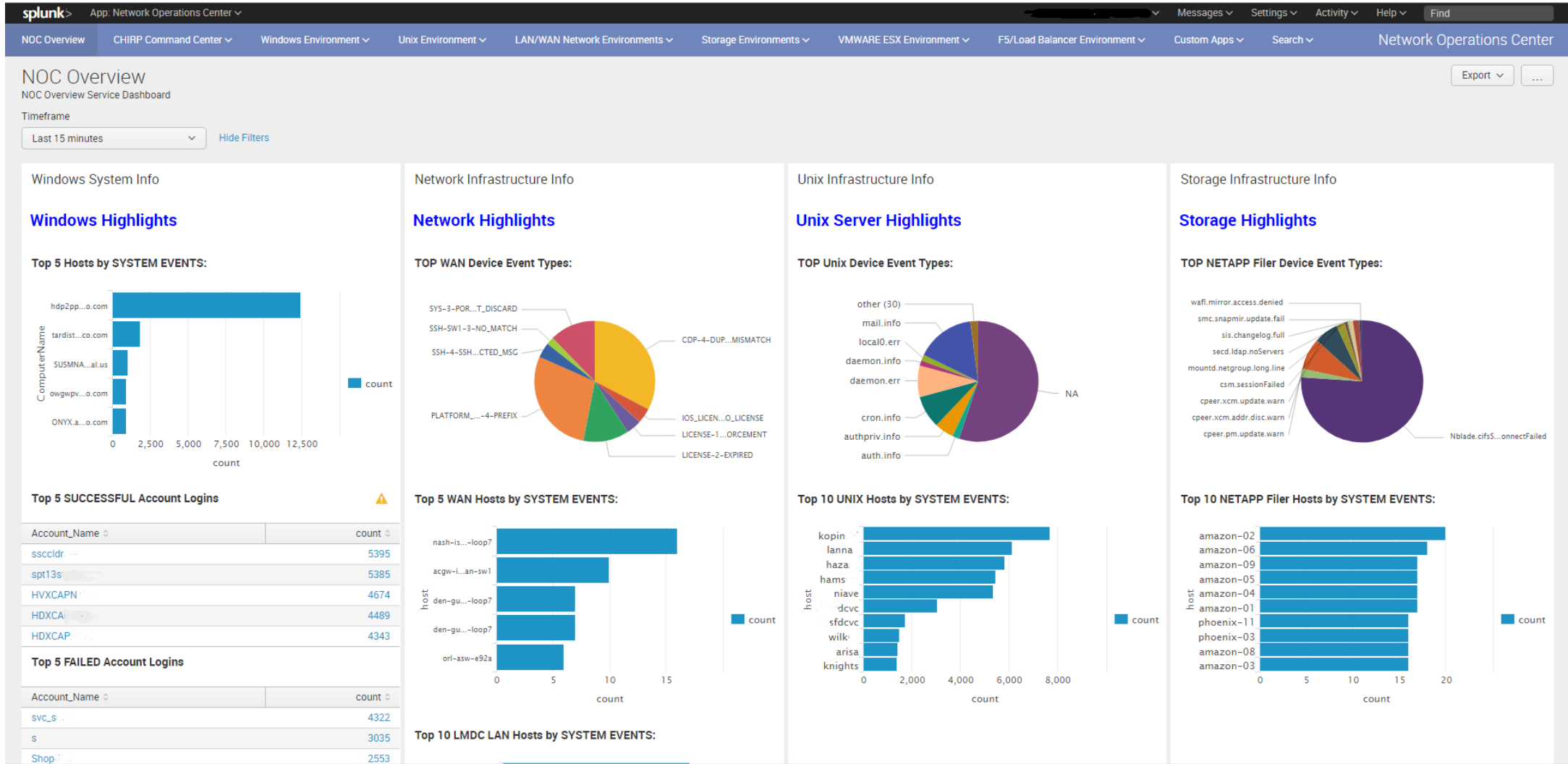
- Newest installation
- Under development to manage service infrastructure and supported business processes

130.60.4... [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=F1-SW-01" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_7; rv:53.0) Gecko/20100801 Firefox/53.0" 128.241.220.82... [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D35L7FF6ADFF0 HTTP 1.1" 404 3322 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-268product_id=K0-CW-01" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_7; rv:53.0) Gecko/20100801 Firefox/53.0" 317 27.160.0.0... [07/Jan 18:10:57:123] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D35L7FF6ADFF0 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 200 2423 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-18&product_id=AV-CB-01" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_7; rv:53.0) Gecko/20100801 Firefox/53.0" 10... [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_7; rv:53.0) Gecko/20100801 Firefox/53.0" 468 125.17.14... [07/Jan 18:10:56:156] "GET /oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/oldlink?item_id=EST-26&JSESSIONID=5D55L9FF1ADFF3" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_7; rv:53.0) Gecko/20100801 Firefox/53.0" 189] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 200 385 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=5D15L9FF10ADFF10" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_7; rv:53.0) Gecko/20100801 Firefox/53.0" 187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D15L9FF10ADFF10 HTTP 1.1" 200 385 "http://buttercup-shopping.com/category.screen?category_id=FLOWERS&JSESSIONID=5D15L9FF10ADFF10" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_7; rv:53.0) Gecko/20100801 Firefox/53.0" 108] "GET /category.action=remove&itemId=EST-14" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_7; rv:53.0) Gecko/20100801 Firefox/53.0"

AWS and Splunk



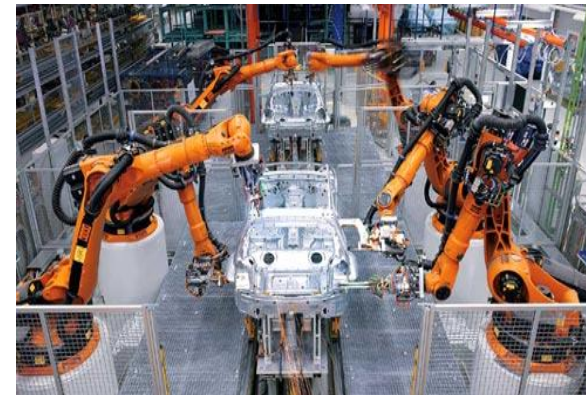
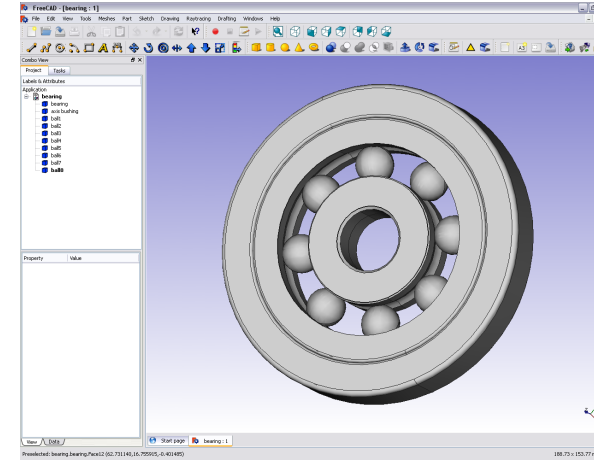
Network and Splunk



Digital Transformation

► Data is Essential to Digital Transformation

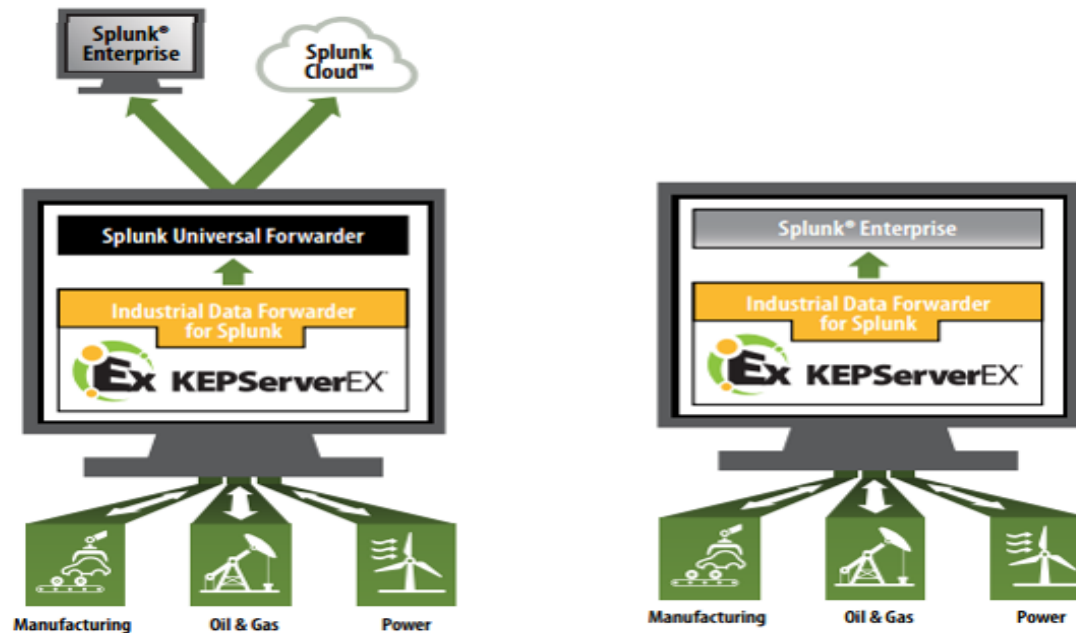
- Digital manufacturing
- From Art to Part
- Internet of Things
- Operational Technology



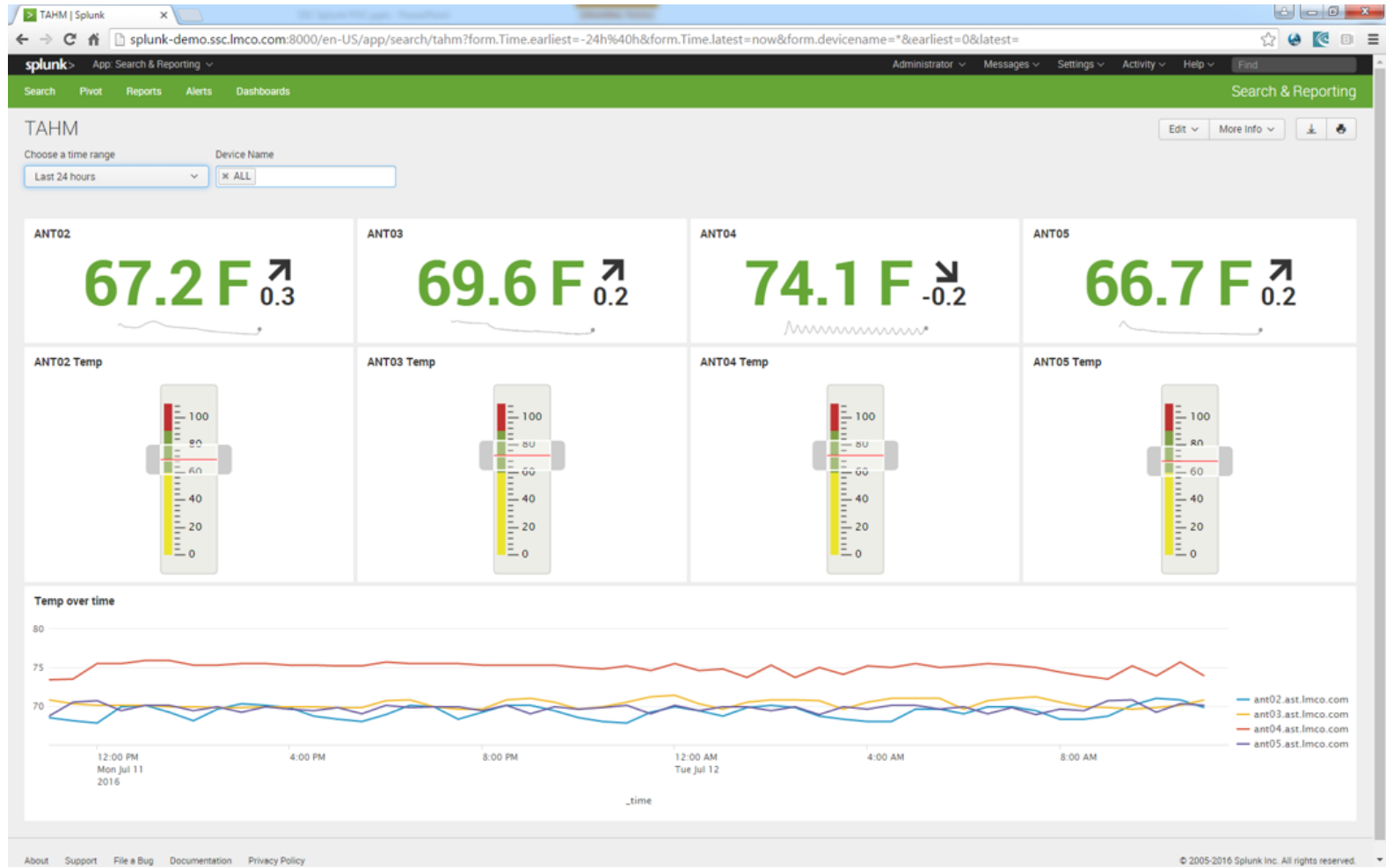
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Expanding the Knowledge Base

- ▶ Getting data from OT systems
- ▶ Using data from manufacturing to be more secure, plan for digital resiliency
- ▶ Using data to manufacture better, smarter



Tracking Autoclave Temperatures



130.60.4 - - [07/Jun 18:10:57:123] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 404 322 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-5W-03" Moz/1.12.0
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10.0.0.0 - - [07/Jun 18:10:56:156] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L9FF1ADFF3 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=purchase&itemId=EST-26&product_id=RP-LI-02" Moz/1.12.0

Tracking Quality

Dashboard

Vendor Name: Defect 1st Level Description: Defect 2nd Level Description: Full Text Search:

Top Vendors

- CIRCUITRY
- SAFETY
- ELECTRONICS
- TECHNOLOGY
- FABRICATING
- NATIONAL
- SPACE
- Test
- CIA
- ADVANCED

Top Defect 1st Level Description By Time

Legend:

- 'Assembl...sembly'
- 'Bonding'
- 'Documenting'
- 'Fabricat...sembly'
- 'Fabricati...ication'
- 'Identifying'
- 'Installing'
- 'Machining'
- 'Soldering'
- 'Testing'

QNotes

Document Number	Creation Date	Closed Date	Defect 1st Level Description	Defect 2nd Level Description	Found Location Description	Responsible Location Description	Vendor Name	Full Text
'0002002958890001'	2014-02-18'	2015-05-01'	'Disassembling'	'Loose Hardware'	'FBM - SWFLANT Integrated Support Fac'	'Design Engineering Design'	NULL	* 02/18/2014 17:28:19 Keith F Fergen (L114598) Phone * \Y\Y\ TEXT: CONDITION OF THE CCA IS SUSPECT OF POSSIBLE DAMAGE DUE TO LOSE HARDWARE FOUND IN THE PACKAGE. * \S\B\ TEXT: NO SUSPECTED DAMAGE PER DRAWING 5676523. * Reference Doc. Type: B/P * Reference Doc. Number: 5676523 * * TEST DATA: (required for Functional indicator
'0002002963830001'	2014-02-25'	2016-01-12'	'Testing'	'Vacuum'	'Sunnyvale-Assy'	'No location responsible; no escapement No location responsible; no escapement'	NULL	Int
'0002002966710009'	2014-	2015-	'Fabrication'	'Dimensional Error'	'Design'	'Design'	NULL	* 06/25/2014 12:43:43 John Smith (L032038) Phone * The plated through hole pattern for connectors

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=5D15LAF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-03" * Mozilla/5.0 (Windows NT 6.0; rv:2.0) Gecko/20100101 Firefox/3.0

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317.27.160.0.0 - - [07/Jan 18:10:56:156] "GET /product.screen?product_id=FL-DSH-01&JSESSIONID=5D95L7FF6ADFF0 HTTP 1.1" 200 1318 "http://buttercup-shopping.com/cart.do?action=changequantity&itemId=EST-18&product_id=AV-CB-01&JSESSIONID=5D55L7FF6ADFF0" * Mozilla/5.0 (Windows NT 6.0; rv:2.0) Gecko/20100101 Firefox/3.0

125.17.14. - - [07/Jan 18:10:55:187] "GET /cart.do?action=remove&itemId=EST-SURPRISE&JSESSIONID=5D55L7FF6ADFF0 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-SURPRISE&JSESSIONID=5D55L7FF6ADFF0" * Mozilla/5.0 (Windows NT 6.0; rv:2.0) Gecko/20100101 Firefox/3.0

125.17.14. - - [07/Jan 18:10:55:189] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L7FF6ADFF0 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-SURPRISE&JSESSIONID=5D55L7FF6ADFF0" * Mozilla/5.0 (Windows NT 6.0; rv:2.0) Gecko/20100101 Firefox/3.0

125.17.14. - - [07/Jan 18:10:55:187] "GET /category.screen?category_id=FLOWERS&JSESSIONID=5D55L7FF6ADFF0 HTTP 1.1" 200 385 "http://buttercup-shopping.com/cart.do?action=remove&itemId=EST-SURPRISE&JSESSIONID=5D55L7FF6ADFF0" * Mozilla/5.0 (Windows NT 6.0; rv:2.0) Gecko/20100101 Firefox/3.0

- ▶ The P-38 Lightning was a fighter of the “Greatest Generation”
- ▶ The F-35 Lightning II is the fighter of the “Next Generation”



Splunk is the platform for Lockheed Martin to build a next generation enterprise to respond to digital transformation, emerging cyber threats, and agile operations by striving to be nimble as a fighter jet.

To get to a new place, start from a new place.

- ▶ “If your want to **change the world**, first **change yourself**” – Leo Tolstoy
- ▶ We are changing how we look at data, our organization, and ourselves
- ▶ Splunk is helping change our enterprise to be as nimble as a fighter jet



F-35
Lightning II



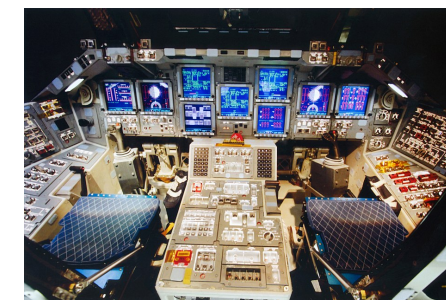
F-22 Raptor



C-130



UH-60 Blackhawk



Orion Spacecraft

130.60.4 - - [07/Jan 18:10:57:153] "GET /category.screen?category_id=GIFTS&JSESSIONID=SD1SLAFF10ADFF10 HTTP 1.1" 404 720 "http://buttercup-shopping.com/cart.do?action=view&itemId=EST-6&product_id=FI-SW-01"
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do?action=purchase&i
shopping.com/c

