Become a Splunk Token Master

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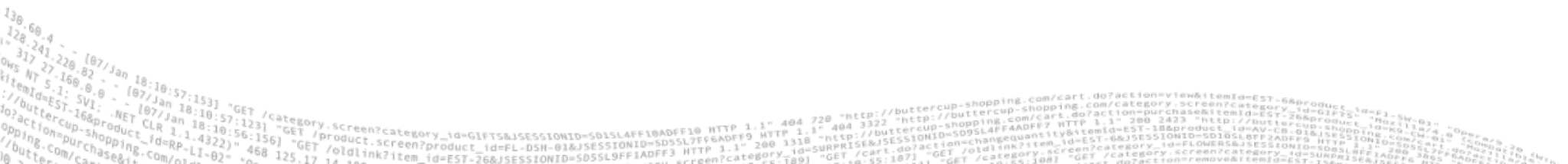
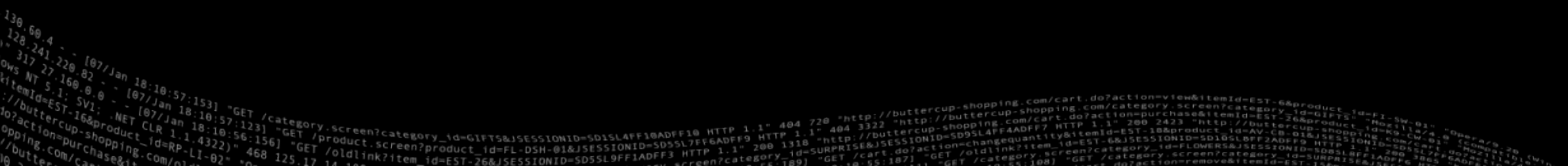


splunk>



splunk> .conf18

My son is a plant manager, he builds Freightliner trucks in North Carolina.

Cyber Security Automation

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Red Alpha, LLC

Mike Deane

Me, on the Thames in London, visiting my daughter who works in the “Walkie Talkie” building. She is a financial accountant for CNA-Hardy.

I have a 80lb seven month old puppy at home, his name is Gunther. He is part Rottweiler and part Standard Poodle.

splunk> .conf18

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This breakout session for
ABSOLUTE BEGINNERS*

- **Get the data for the code examples:**
  - http://splk.it/f1data
  - http://docs.splunk.com/Documentation/Splunk/7.0.1/SearchTutorial/Systemrequirements#Download_the_tutorial_data_files
- **Get the code examples:**
  - https://github.com/endurall/splunk-token-master

*can serve as a refresher for Splunkers with some experience or even grizzled veterans

*maybe trainers will want to attend, to see what remediation may be required for the poor noobs that are here

Token Mastery Roadmap for Absolute Beginners

- Step 1: Use OOTB (out-of-the-box) Splunk Web **event search** and **report drilldowns**
- Step 2: Use Simple XML, use the **dashboard drilldown editor** and **predefined tokens**
- Step 3: Use Simple XML, leverage **custom (including auto generated) tokens** in **forms**
- Step 4: Use Simple XML, manipulate interactions with **JavaScript extensions**
- Step 5: Insert **INLINE HTML** into Simple XML and do amazing things with JavaScript extensions
- Step 6: Leave Simple XML and, possibly, leave Splunk Web entirely!!!
  - Simple XML converted to HTML code and Splunk Web Framework (JavaScript) extensions
  - Access Splunk data from your own external web site, using the SplunkJS Stack
  - Splunk Add-on to Splunk Web
  - Splunk App for Splunk Web
  - Splunk App (runs a completely custom GUI, does not run in Splunk Web)
  - Splunk REST API
  - Splunk SDKs (JavaScript, Java, Python, C#)

Skills Needed To Become A Token Master

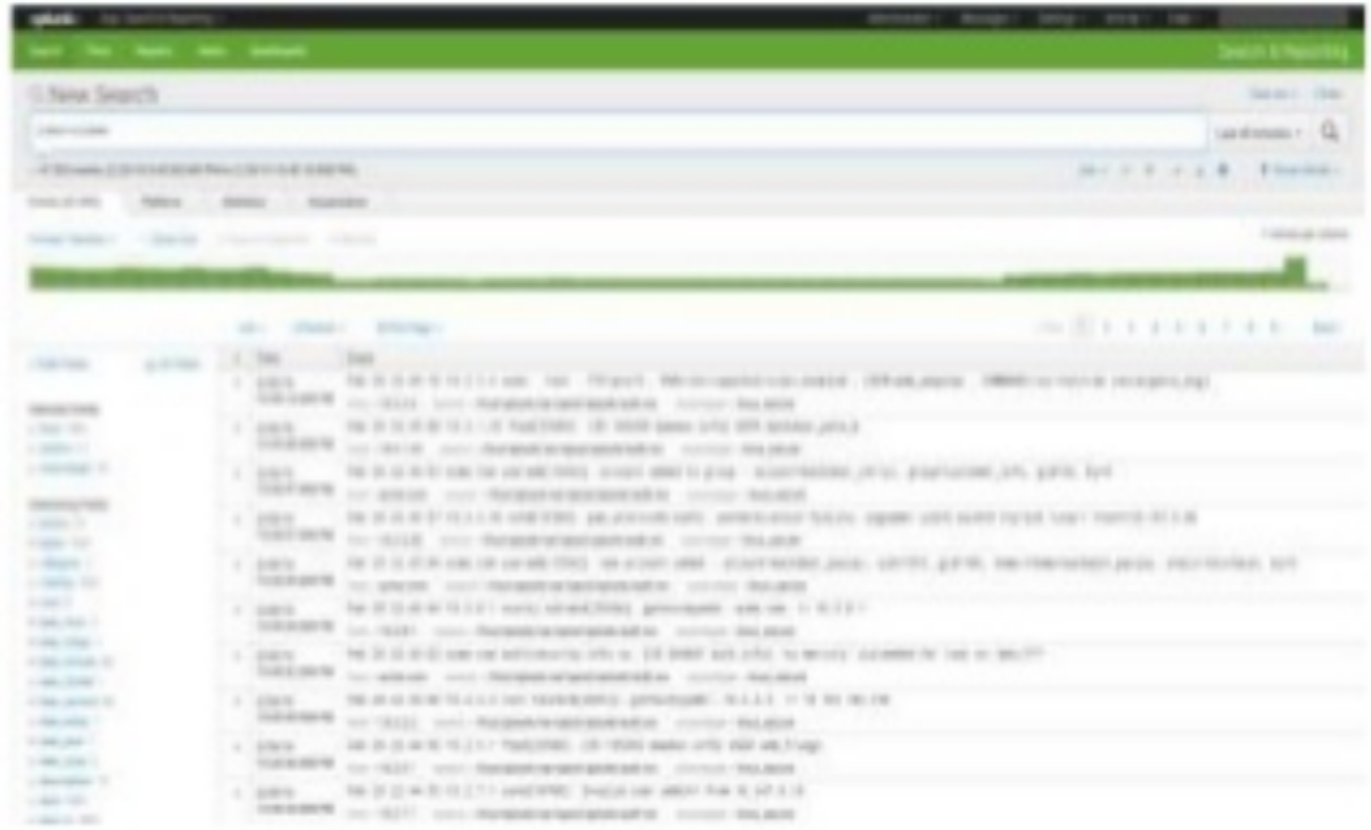
- **Splunk**
  - **SPL**
  - Understand the **file/directory structure** of **Splunk applications**
  - **Simple XML**
- **JavaScript**
  - Understand the use of **RequireJS** (modular script loader)
  - Understand the use of **backbone.js** (model-view-presenter framework)
  - Understand the use of **jQuery** (client-side DOM manipulation)
  - Understand the **Splunk Web Framework** and the **SplunkJS Stack**
- **Web application development**
  - **HTML**
  - **CSS**
  - Understand the basics of **web application servers**

Step 1: OOTB Event Search and Report Drilldowns

Drilldowns are the Model for All Splunk Interactivity

Searching

Search > *



Select Time Range

- Historical, custom, or real-time

Select Mode

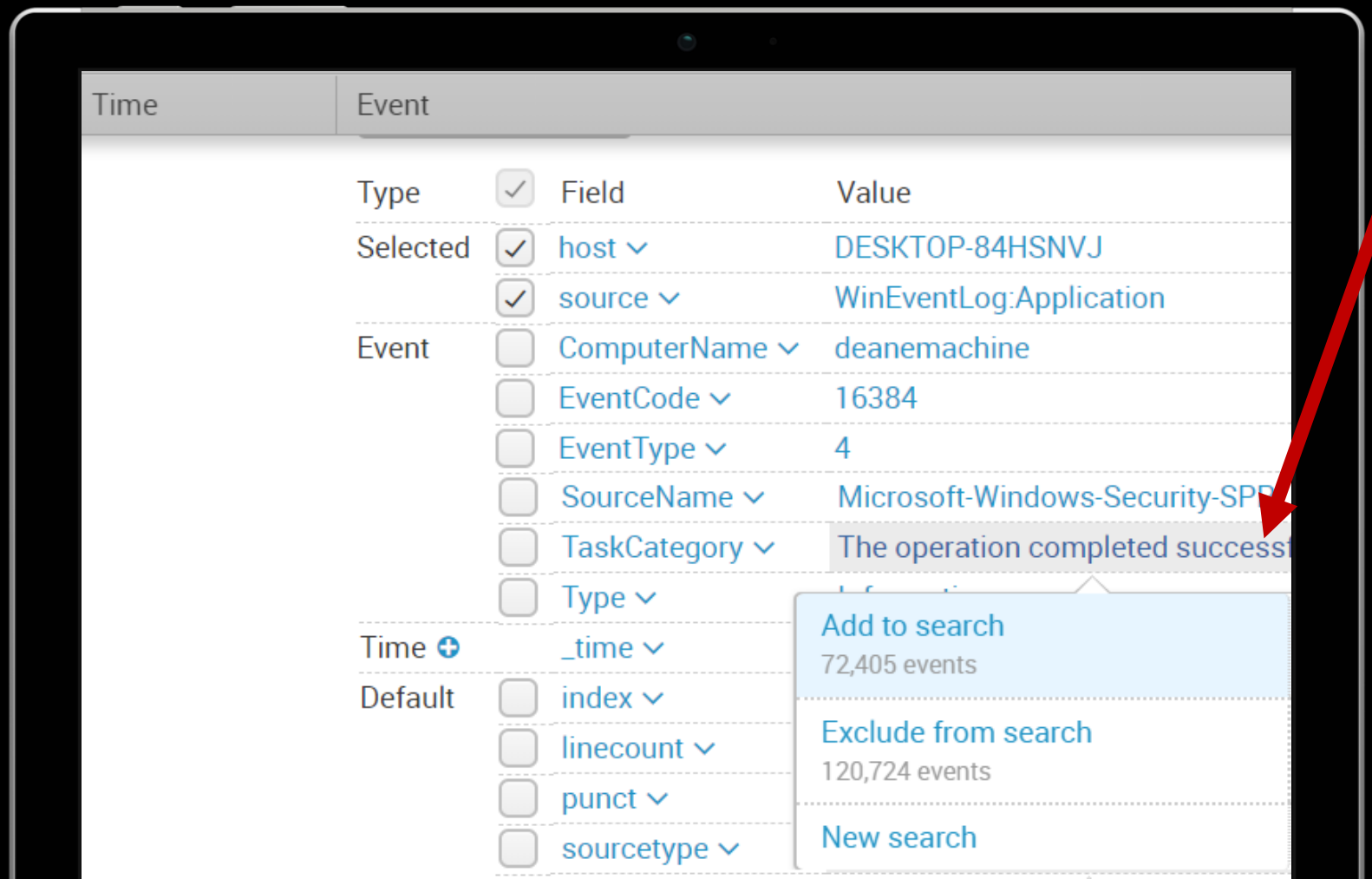
- Smart, Fast, Verbose

Using the timeline

- Click events and zoom in and out
- Click and drag over events for a specific range

Select Search Events, Then Drill Down

Rerun the Search Based on 1-of-3 Options



Select a search event

1. You can add the selected value as a filter to the existing search
2. You can exclude that value in the existing search
3. You can run a whole new search looking only for that event

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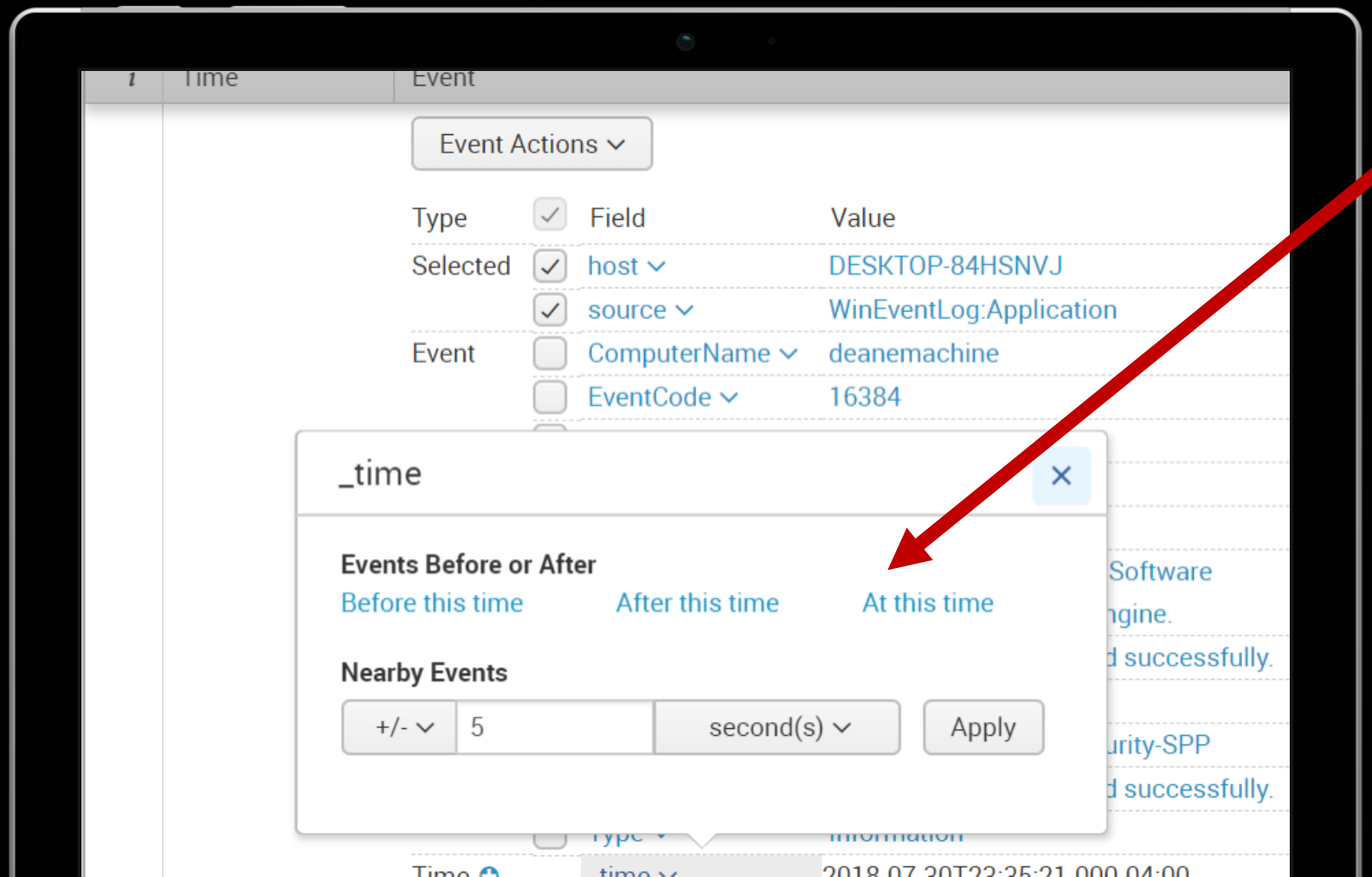
Select Search Events, Then Drill Down

Rerun the Search by Narrower Time Range



Narrow the search based on time

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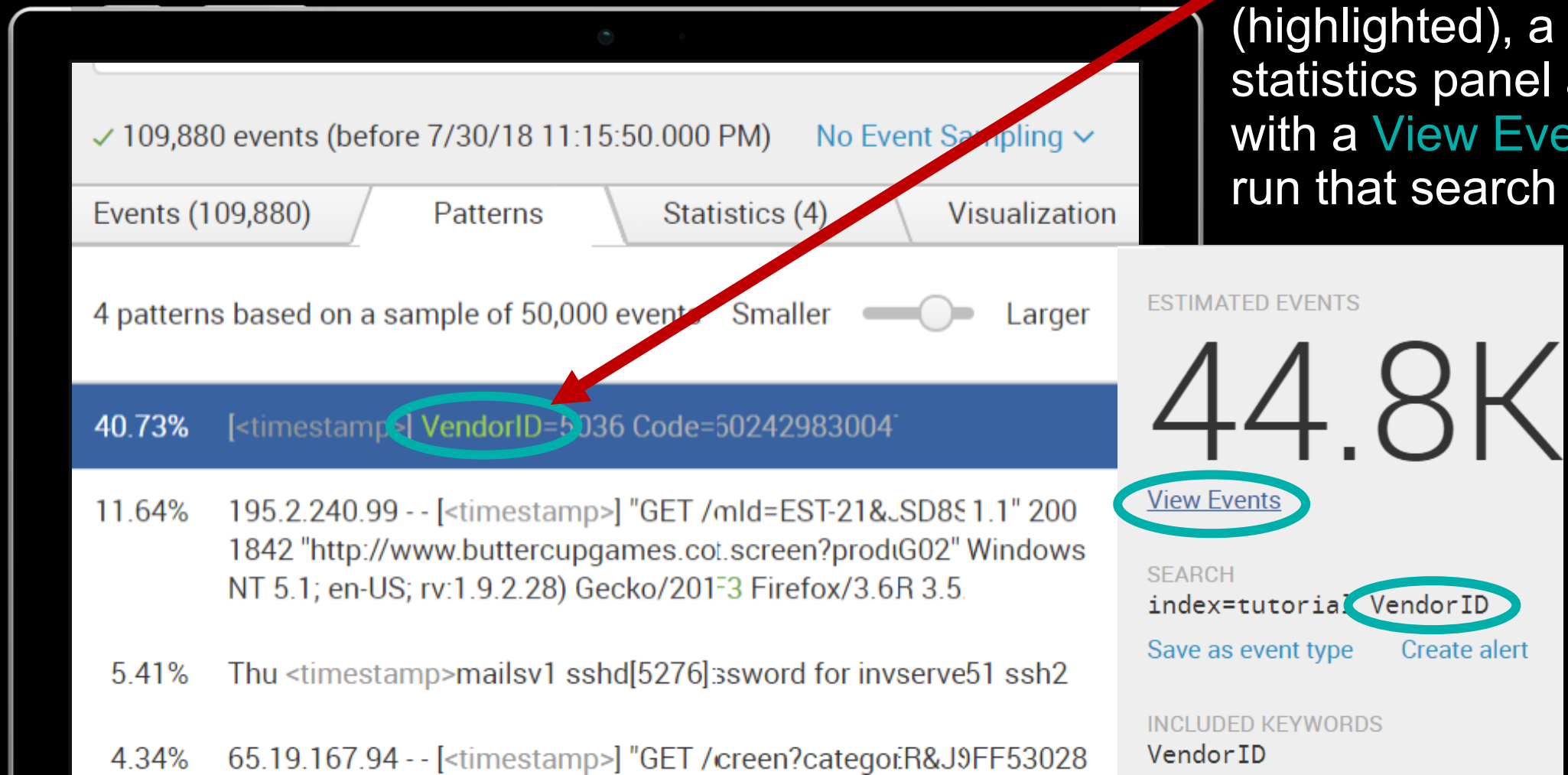
Select Search Patterns, Then Drill Down

Filter Down the Search to a Single Pattern

Select a pattern value (highlighted), a summary statistics panel appears with a View Events link to run that search



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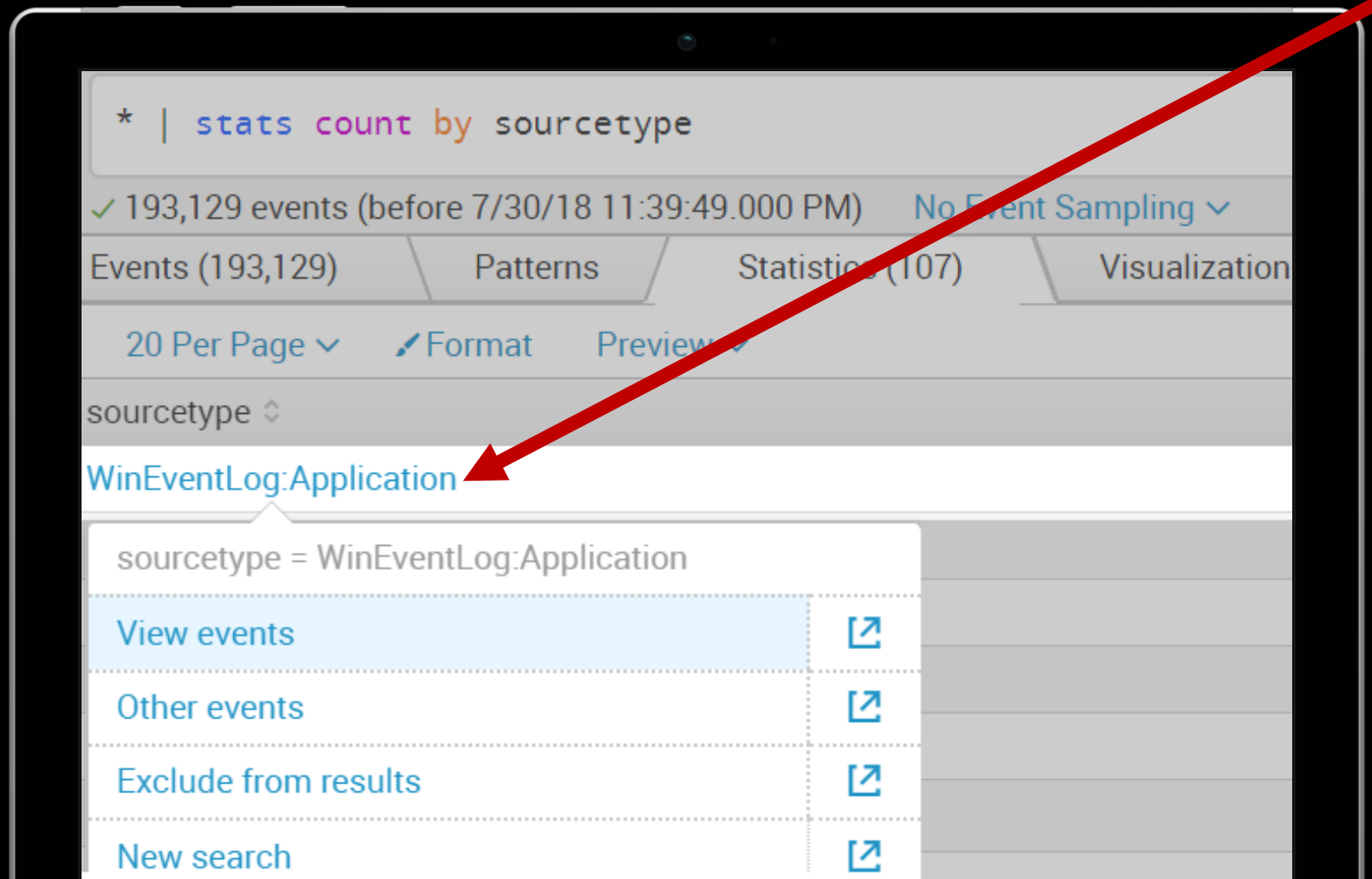
Select Search Statistics, Then Drill Down

Rerun the Search Based on 1-of-4 Options



Select a statistic

1. You can add the selected value as a filter to the existing search
2. You can run a whole new search where NOT EQUAL to that value
3. You can exclude that value in the existing search
4. You can run a whole new search looking only for that value

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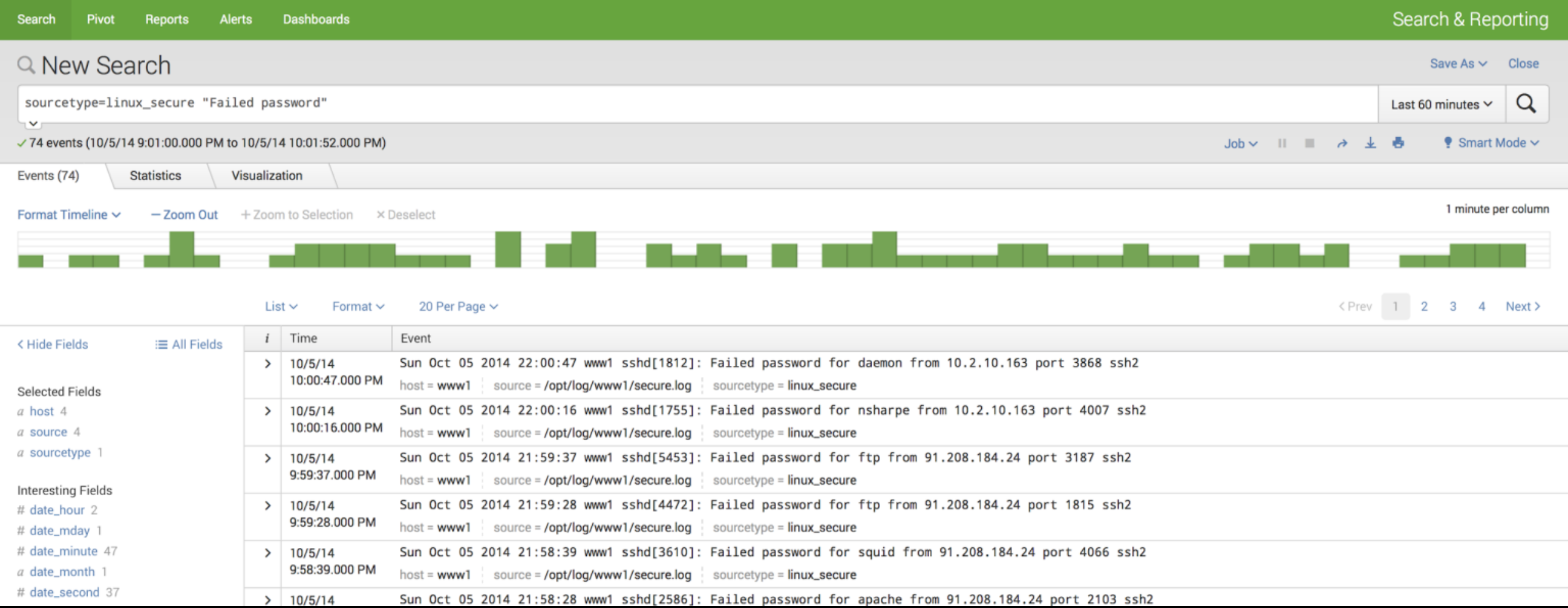
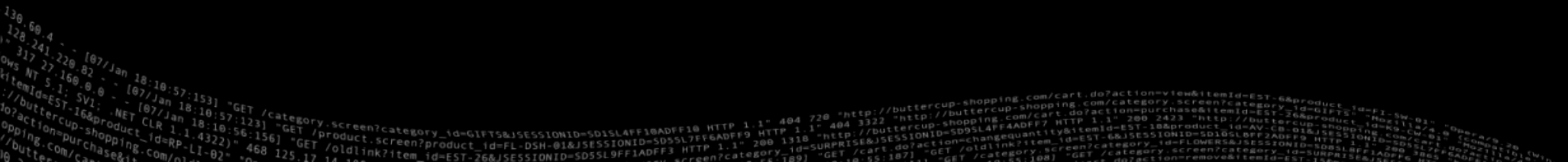


SEARCH EVENTS DRILLDOWN DEMO

splunk> .conf18

Poll Question

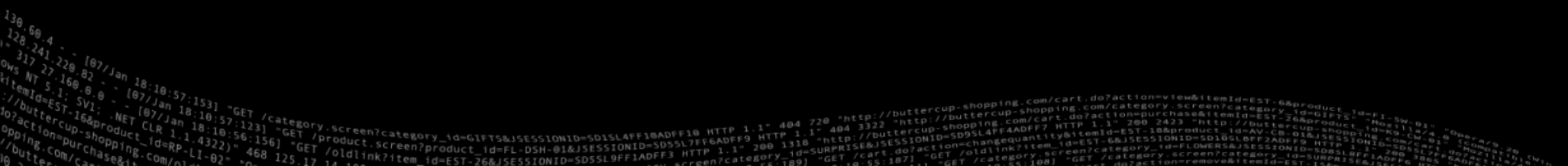
What drilldown options do you have available for a report?



What drilldown options do you have available for a report?

Answer: Only 1.

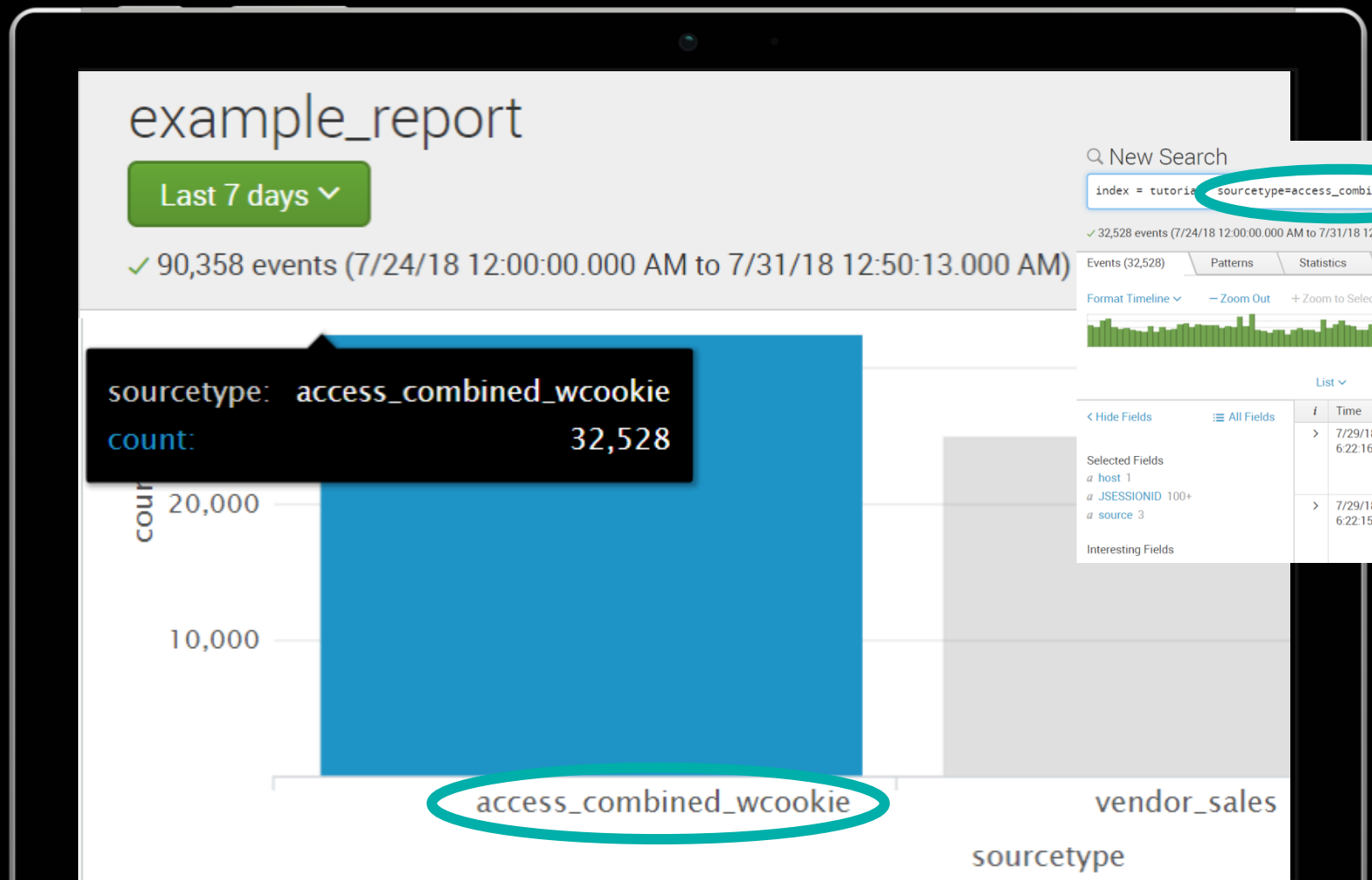
When you click on a report the Splunk Search and Reporting application will open, a new search will be executed, and the new search result will be the original search filtered by whatever selection you made on the report.

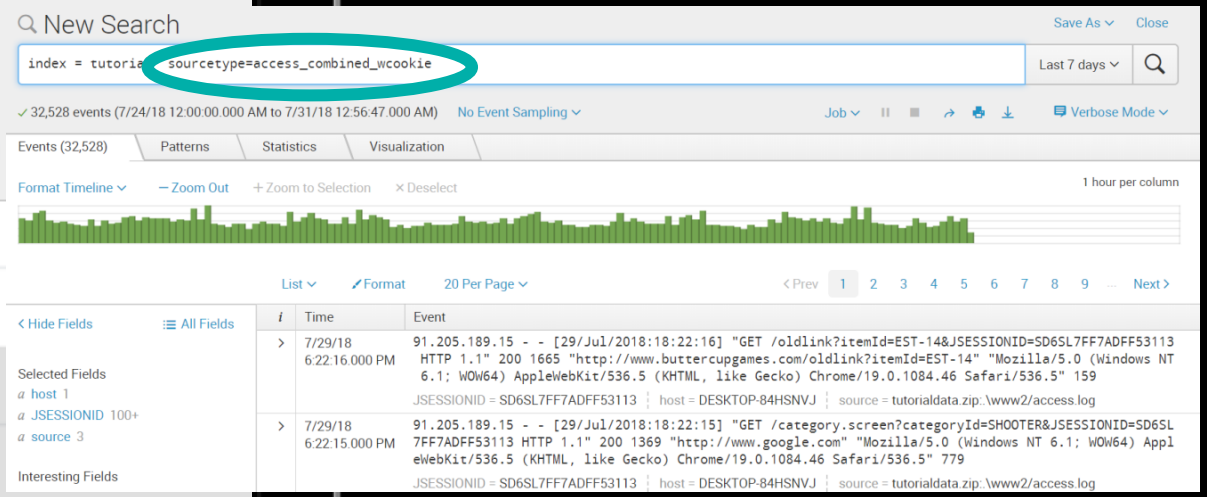


Select A Report, Then Drill Down

Filter Down the Search to Include Only the Selections You Make on the Report

- When you make a selection on the visualization, a new search will run





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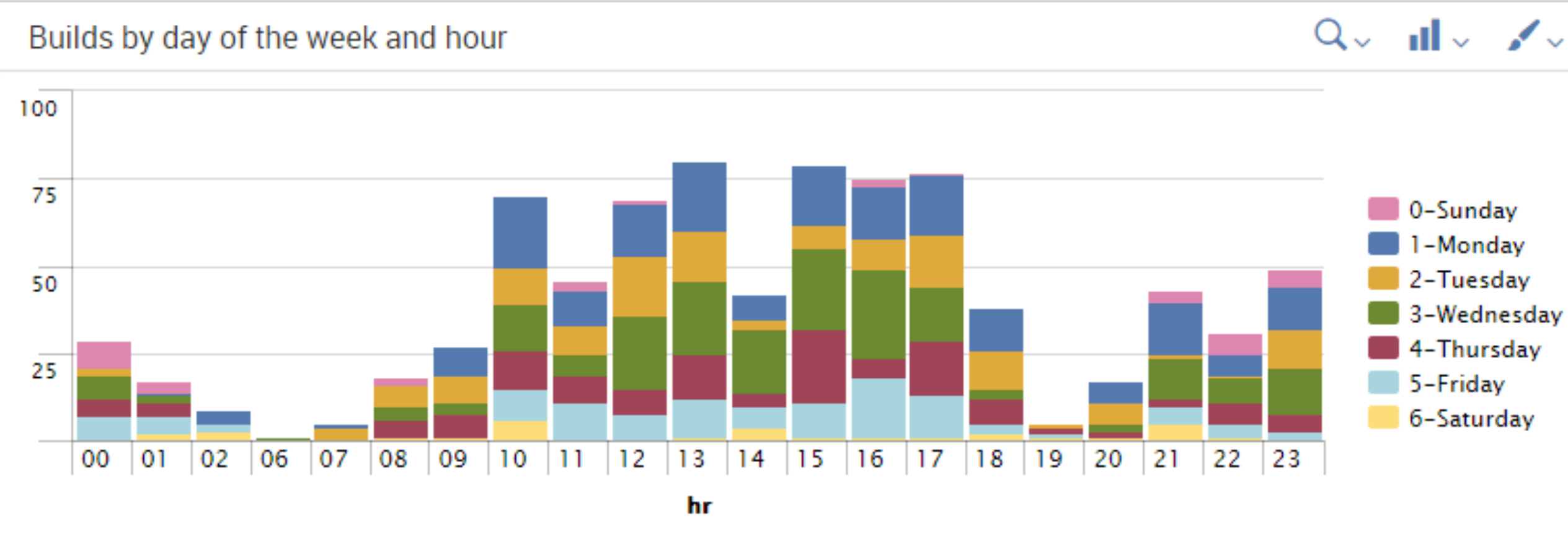


REPORT DRILLDOWN DEMO

Differences Between Reports, Dashboards, and Forms

Report

A report is a table or a visualization displaying data returned from a search. You can save a table or a visualization as a report. A report is built using the Splunk Web user interface. It is not editable or customizable, other than the configuration options available in the Splunk Web UI.

Dashboard

You can also save a table or visualization as a dashboard panel (an object on a dashboard). A dashboard is editable and customizable using Simple XML, HTML, and SDKs.

Form

A special kind of dashboard is a form. The dashboard is transformed into a form when data entry and selection mechanisms are added (i.e., text boxes, dropdown lists, multiselect lists, checkboxes, radio buttons,submit button, etc.).

Step 2: Dashboards Drilldown Editor, Predefined Tokens, & Simple XML

Dashboard Interactivity Based on Predefined Tokens

splunk> .conf18

Save As Dashboard Panel

Dashboard: New | Existing

Dashboard Title: dashboard-panel

Dashboard ID ?: dashboardpanel

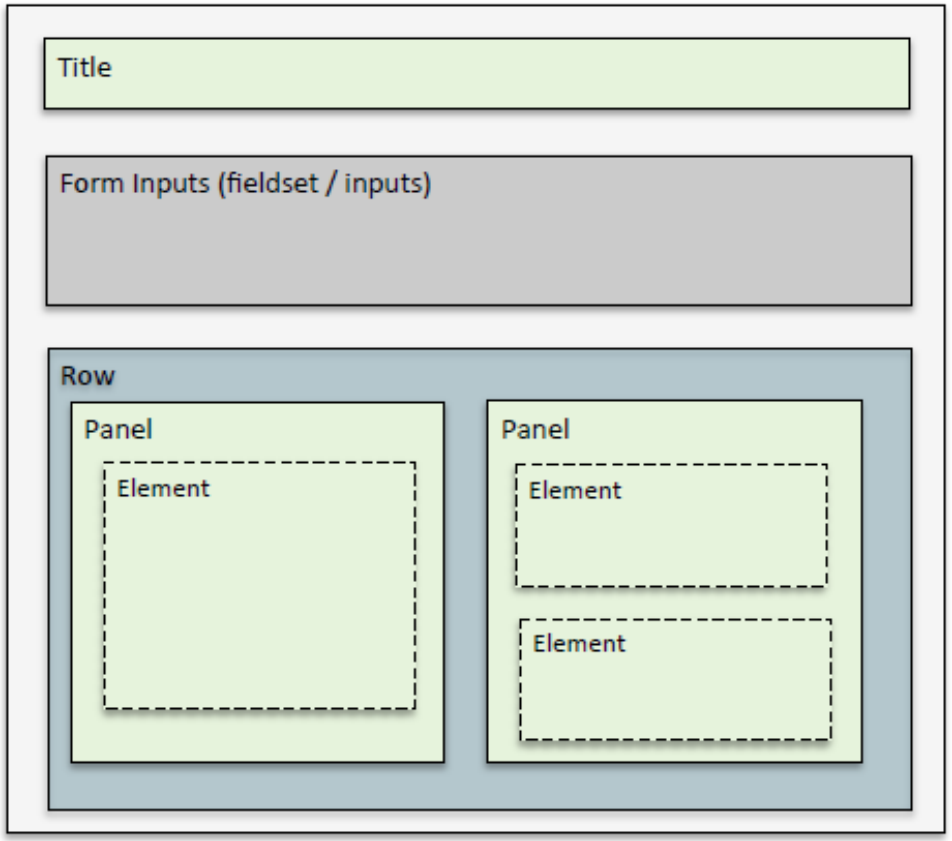
Can only contain letters, numbers and underscores.

Dashboard Description: optional

Dashboard Permissions: Private | Shared in App

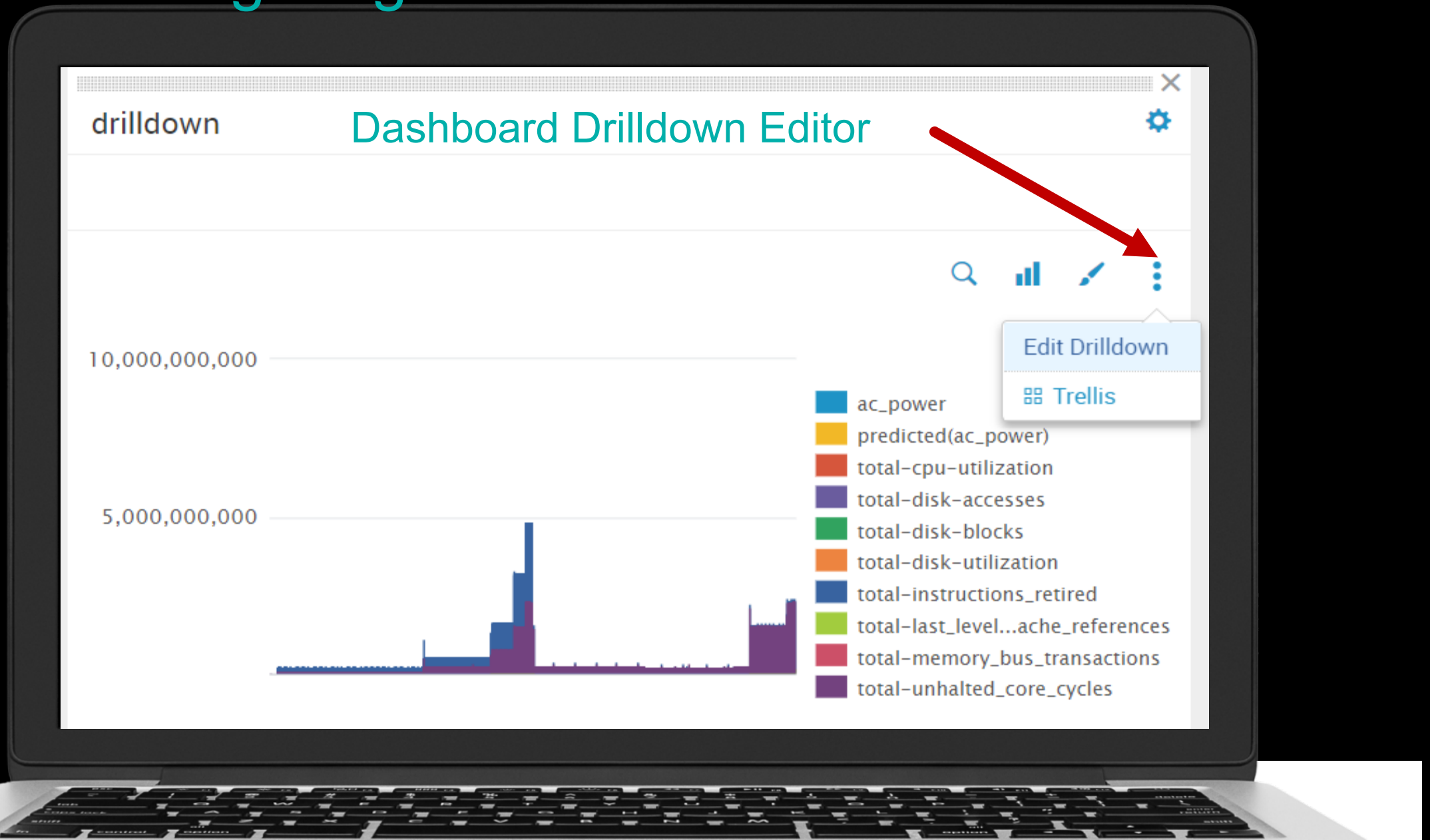
Drilldown is disabled when you save a visualization to a dashboard. After saving, open the dashboard editor to access configuration options for the visualization. Click "Edit Drilldown" to enable and configure drilldown.

Drilldown ? No action



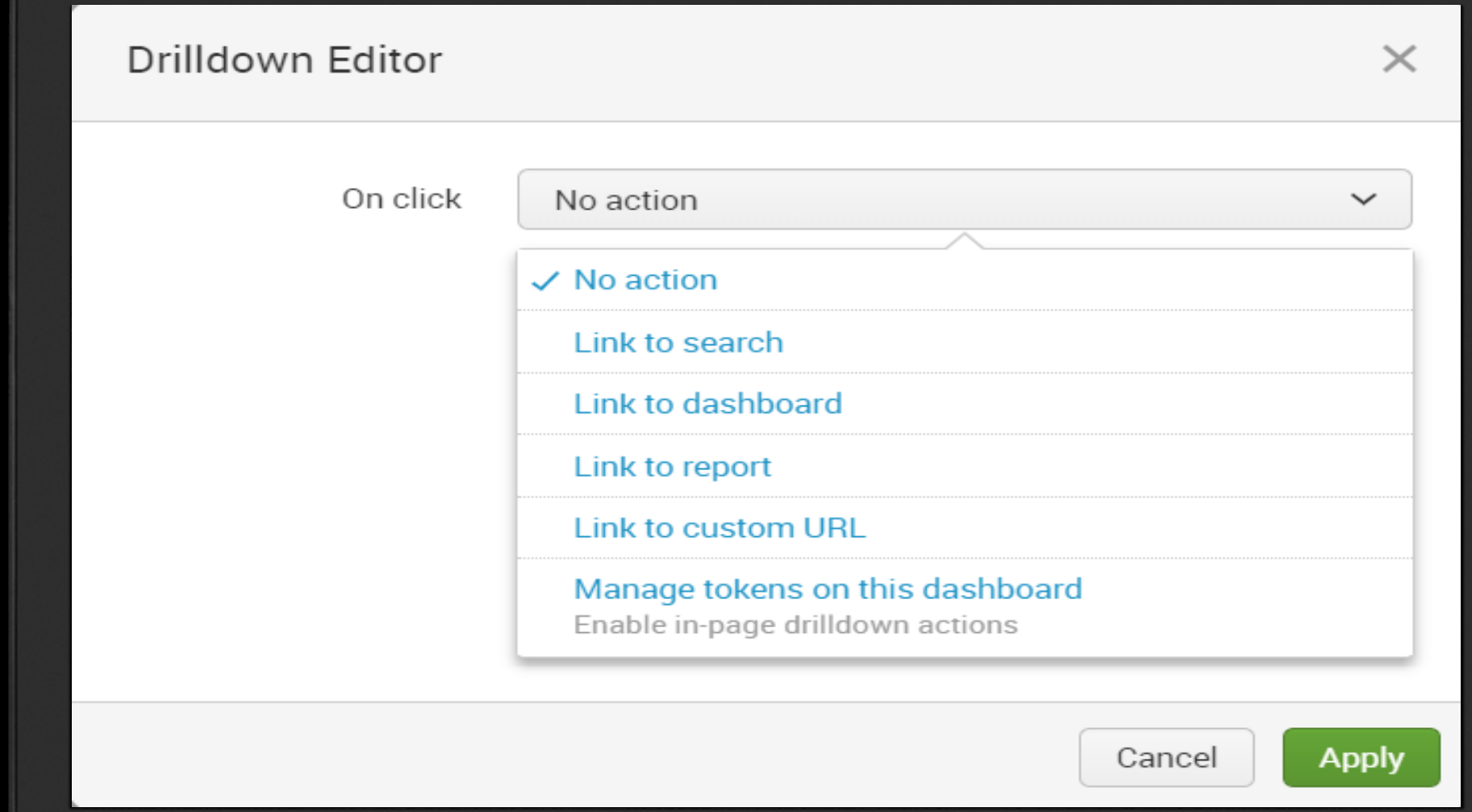
Once you have saved a table or visualization as a dashboard panel, you can edit it using the Dashboard Drilldown Editor (see the next slide).

Configuring Drilldown on a Dashboard



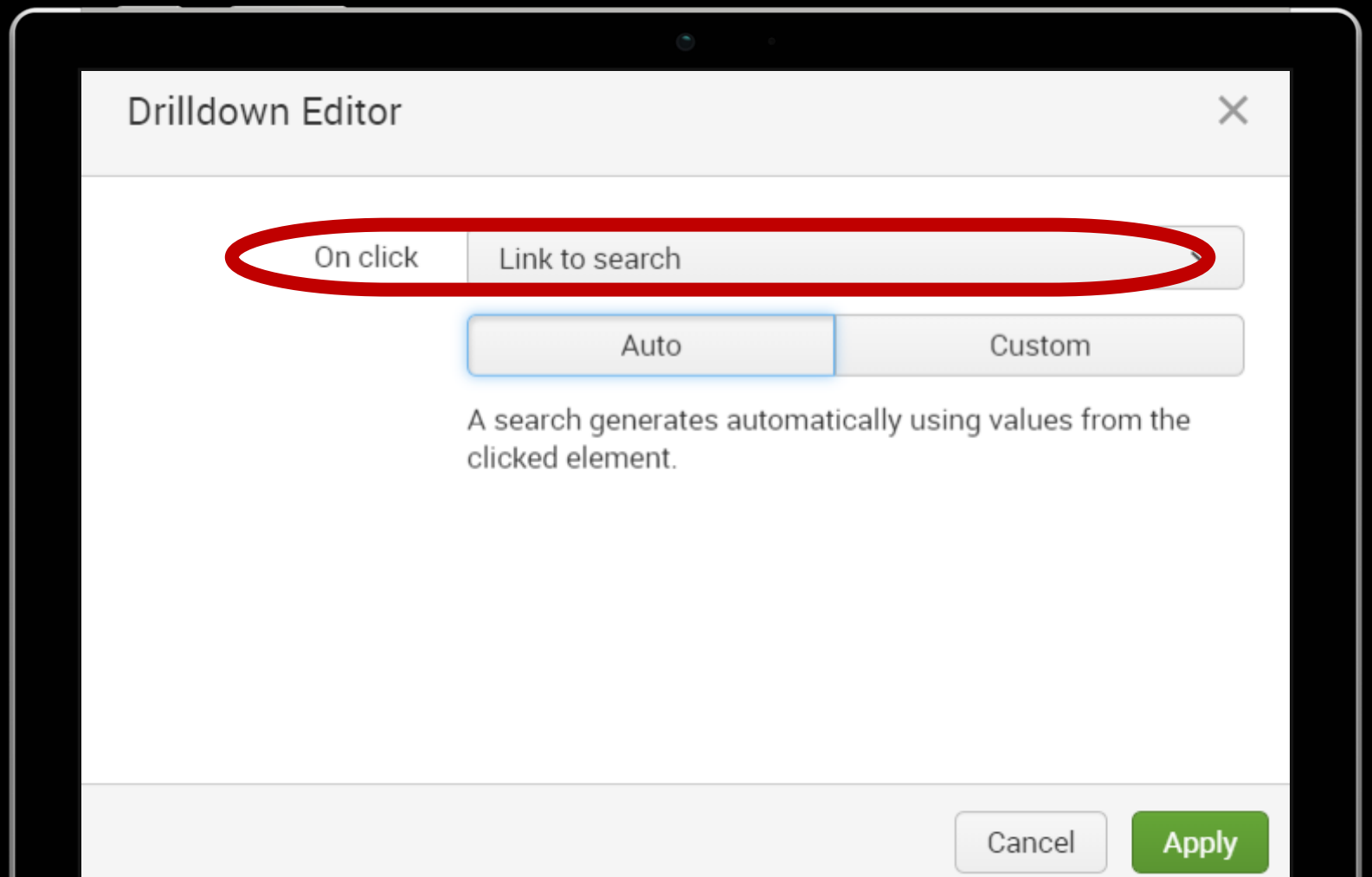
Dashboard Drilldown Editor

Options Available in the Drilldown Editor



Dashboard **Link to Search** Drilldown

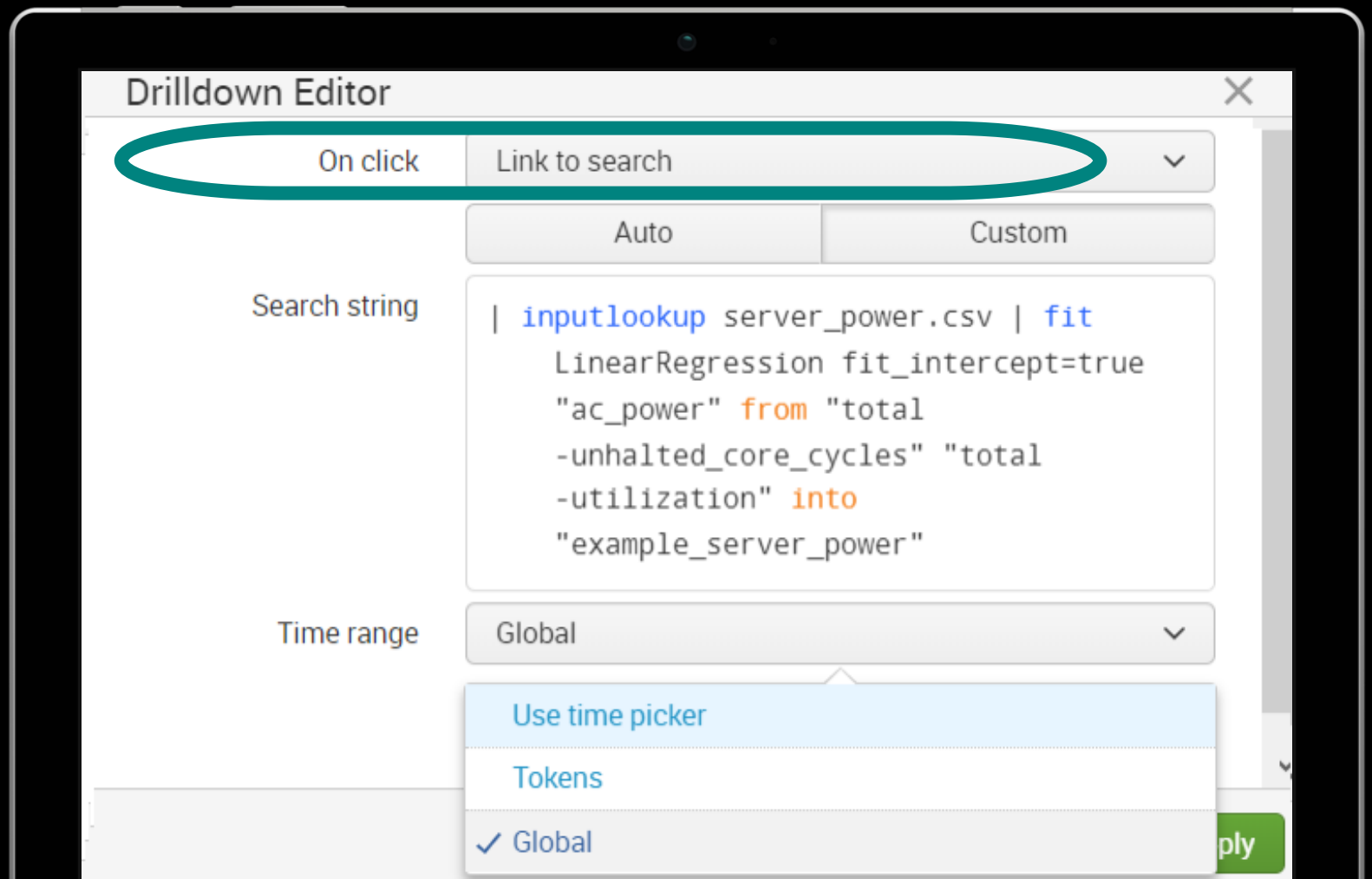
Auto Settings



- When you make a selection on the visualization, the selected value will be added as a filter to the existing search

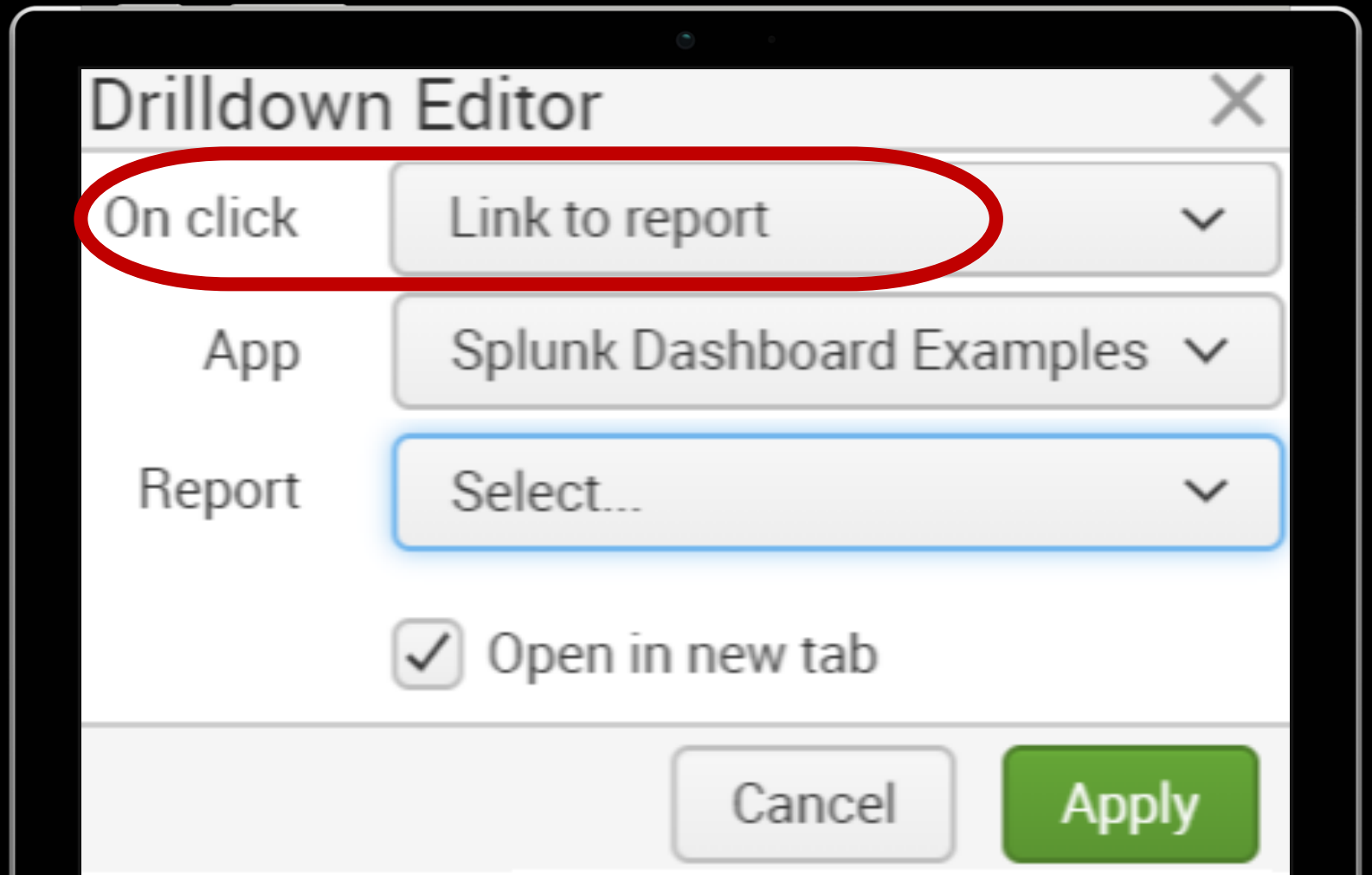
Dashboard **Link to Search** Drilldown

Custom Settings: Run a Completely Different Search



- When you make a selection on the visualization, a new search will run
  - Customize the search string to run
  - Configure the time range for the search
    - NOTICE: Tokens are an option, this is the first sign of tokens!!!

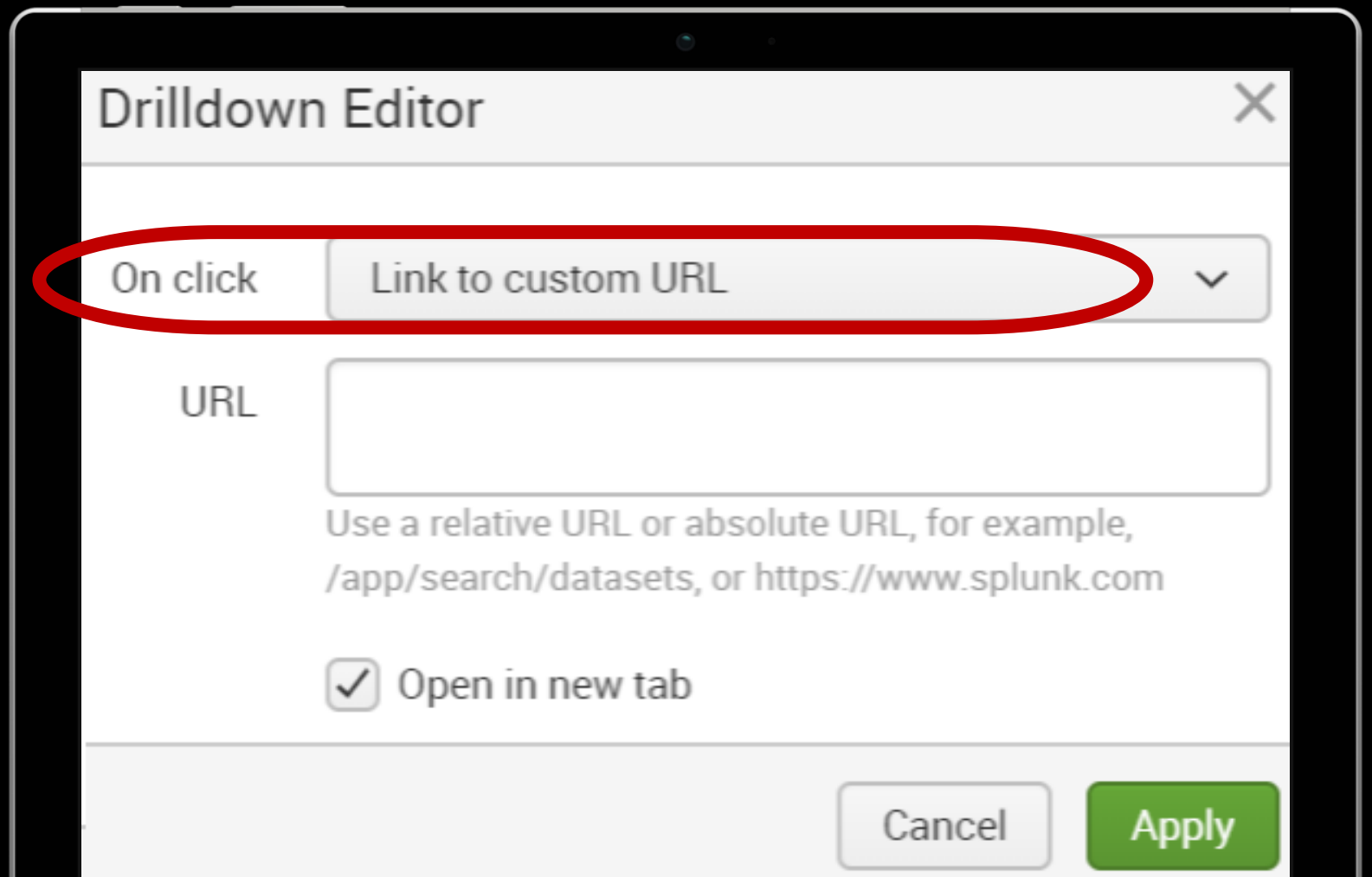
Dashboard **Link to Report** Drilldown



- When you make a selection on the visualization, a pre-existing report will open

Dashboard **Link to Custom URL** Drilldown

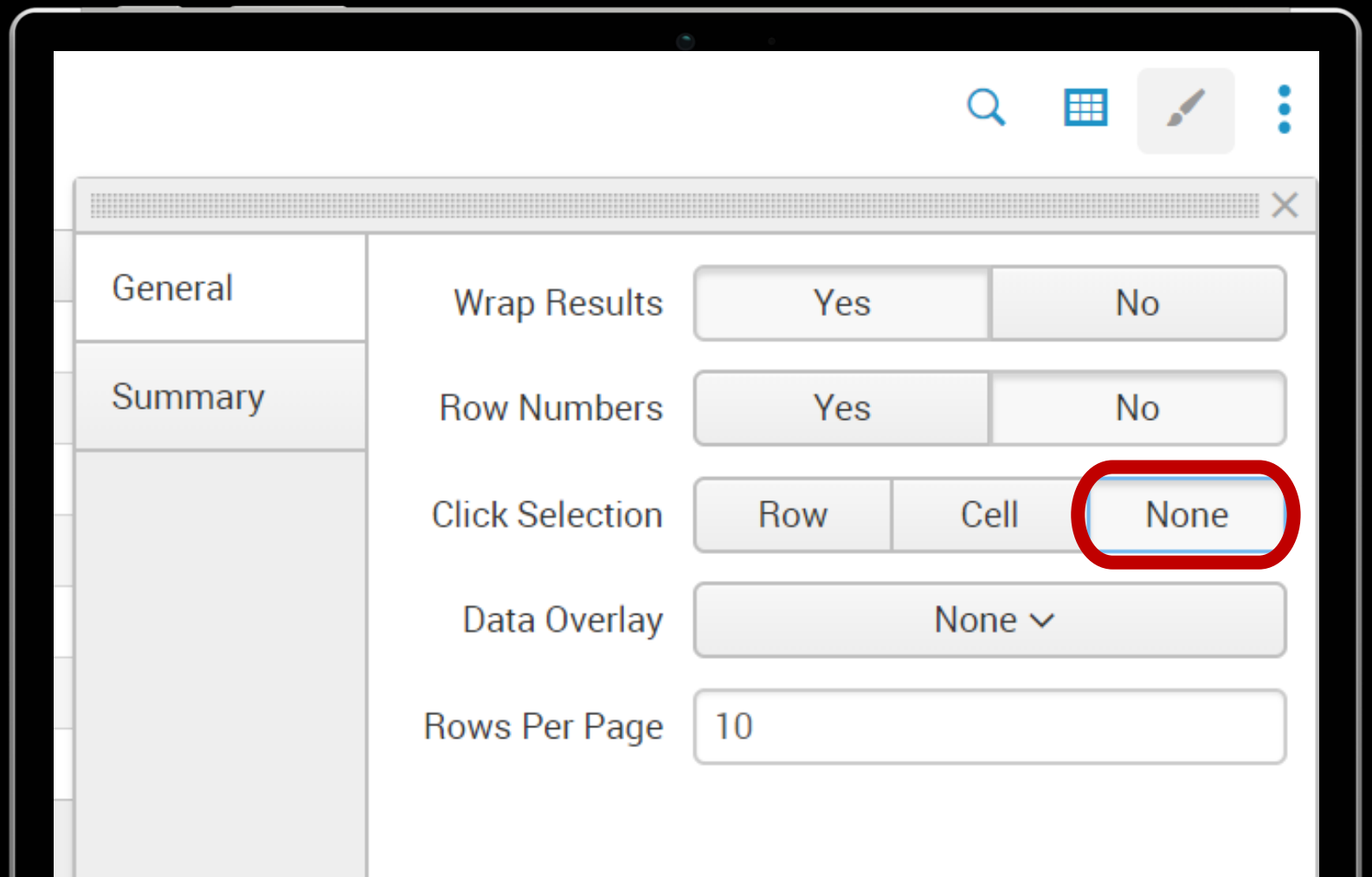
May be external to Splunk



- When you make a selection on the visualization, a URL will open

Dashboard **Disable** Drilldown

No Drilldown on this Dashboard



- Select paint brush
  - General tab
    - Click Selection
      - None

Drilldown Elements

Disable Drilldown Action

Disable drilldown action through UI Editor or editing XML.

NEW EXAMPLE

6.2 6.3 6.4 6.5 6.6

Drilldown to Search

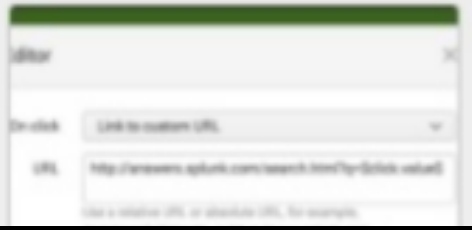
Enable drilldown to search action through UI editor or editing XML.

NEW EXAMPLE

6.2 6.3 6.4 6.5 6.6

Drilldown Link to Report

Enable link to report action through UI Editor or editing XML.



Drilldown Link to Custom URL

Enable link to custom url action through UI Editor or editing XML.

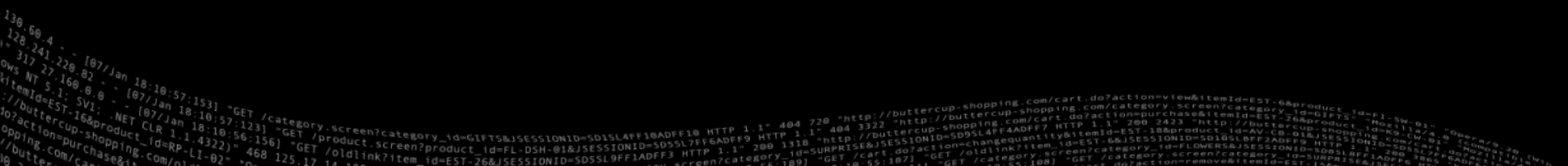
DASHBOARD DRILLDOWN EDITOR

DRILLDOWN TO SEARCH, LINK TO REPORT, LINK TO URL, & DISABLE DRILLDOWN

splunk> .conf18

Poll Question

How many Splunk Web predefined tokens can you name?



splunk> .conf18

How Many Splunk Web Predefined Tokens Can You Name?

Answer: There are many.

Event (all): click.name, click.value, click.name2, click.value2, row.<fieldname>, earliest, latest

Trellis: trellis.name, trellis.value

Chart: row.<x-axis-name>

Map: click.lat.name, click.lat.value, click.lon.name, click.lon.value

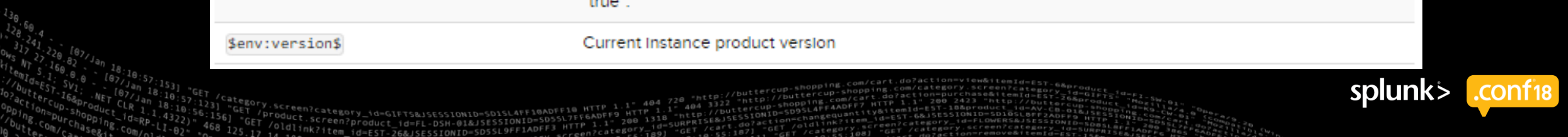
Cluster Map: click.bounds.<orientation>

Environment: *see on a following slide*

Job Properties: *see on a following slide*

Predefined Tokens for Splunk Environment Information

Name	Description
`$env:user$`	Current user's user name
`$env:user_realname$`	Current user full name.
`$env:user_email$`	Current user email address.
`$env:app$`	Current app context
`$env:locale$`	Current locale
`$env:page$`	Currently open page
`$env:product$`	Current instance product type
`$env:instance_type$`	Indicates whether the current instance is Splunk Cloud or an on-premises deployment
`$env:is_cloud$`	Indicates if the current instance is Splunk Cloud. This token is only set when "true".
`$env:is_enterprise$`	Indicates if the current instance is a Splunk Enterprise deployment. This token is only set when "true".
`$env:is_hunk$`	Indicates if the current instance is a Hunk deployment. This token is only set when "true".
`$env:is_lite$`	Indicates if the current instance is a Splunk Light deployment. This token is only set when "true".
`$env:is_lite_free$`	Indicates if the current instance is using a Splunk Light free license. This token is only set when "true".
`$env:is_free$`	Indicates if the current instance is using a Splunk Enterprise free license. This token is only set when "true".
`$env:version$`	Current instance product version



splunk> .conf18

Predefined Tokens for Search Job Properties

`$job.earliestTime$`: Initial job start time.

`$job.latestTime$`: Latest time recorded for the search job.

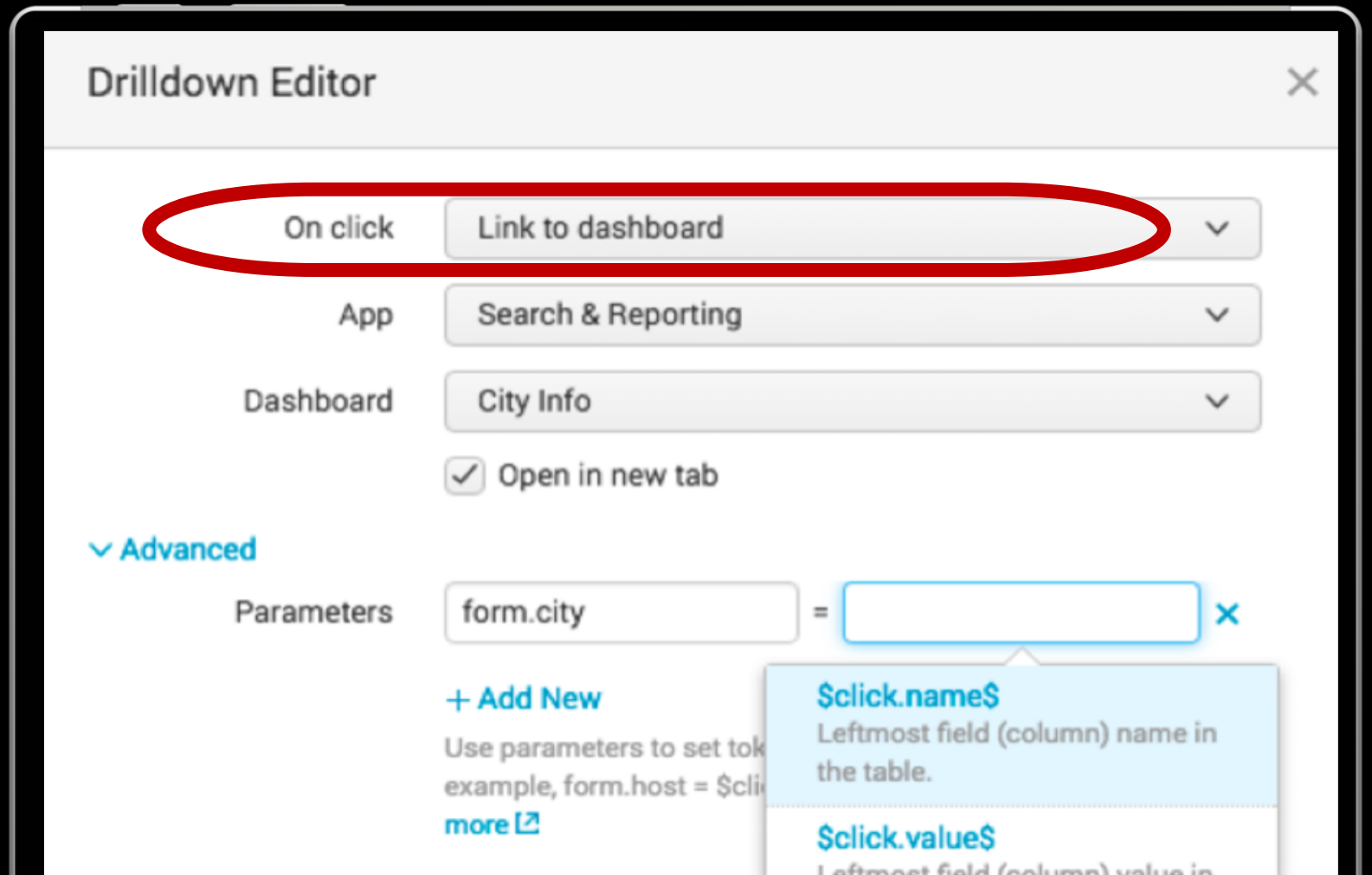
`$job.resultCount$`: Number of results a search job returned.

`$job.runDuration$`: Time, in seconds, for the search to complete.

`$job.messages$`: List of error and/or debug messages generated by the search job.

Dashboard **Link to Dashboard** Drilldown

Select a Different Dashboard & Pass Parameters to the Search in the Other Dashboard

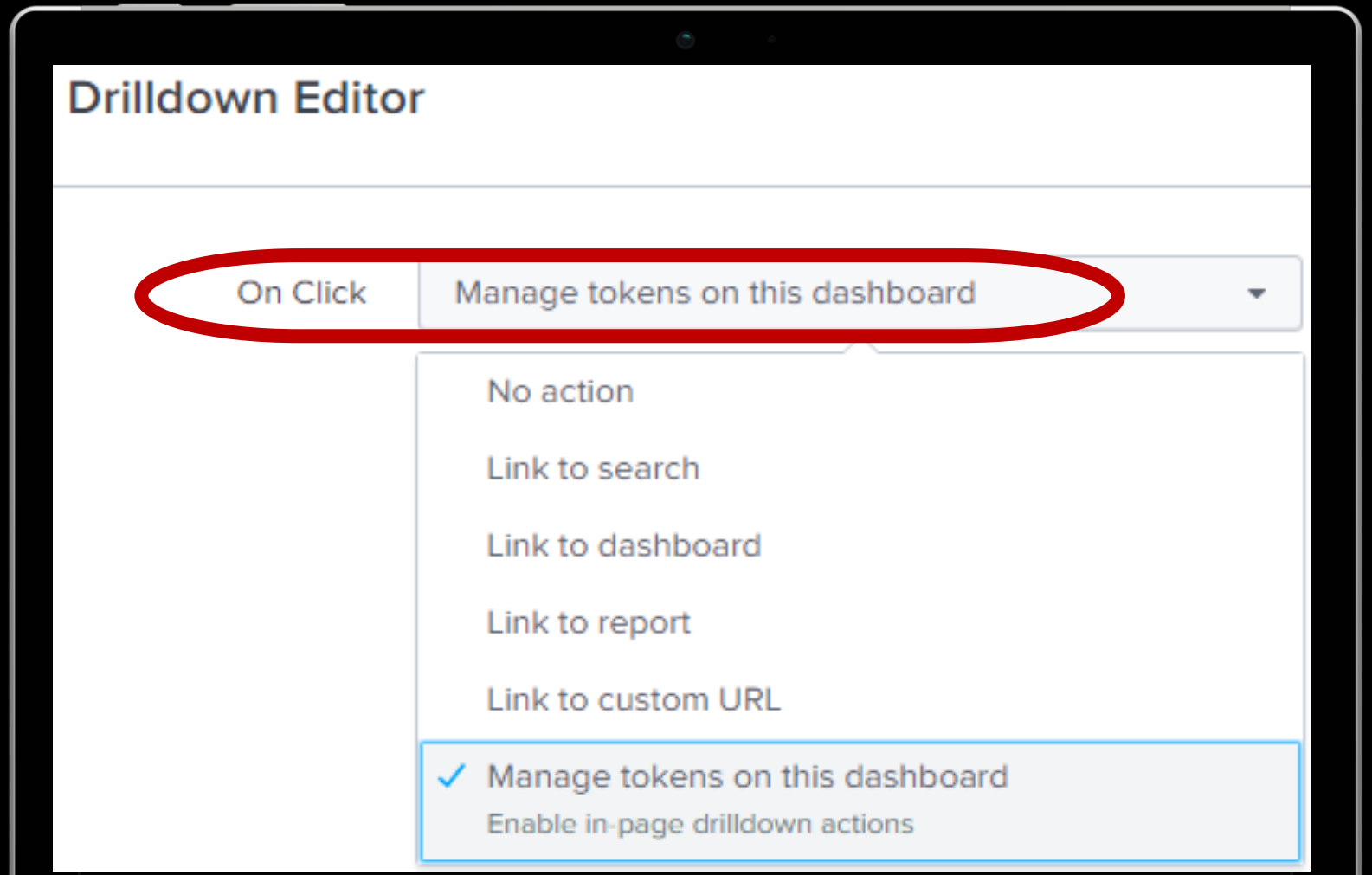


- When you make a selection on the visualization, a pre-existing dashboard will open
  - Parameters can be passed to the other dashboard
    - **NOTICE:** The parameters are passed using tokens!!!
    - **parameter = predefined or custom token**

splunk> .conf18

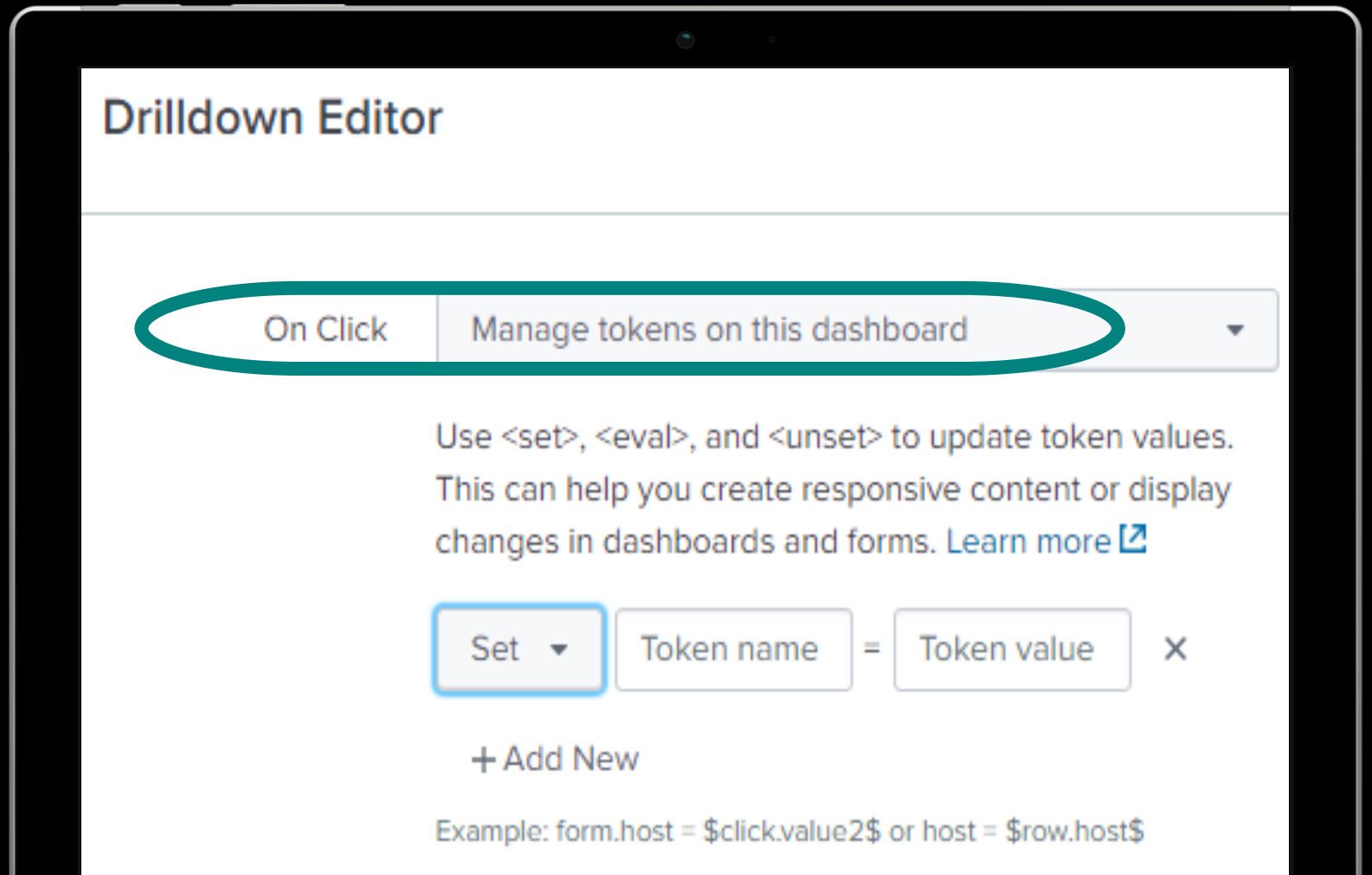
Dashboard **In-page** Drilldown

Configure In-page Drilldown Actions



Dashboard **In-page** Drilldown

<set>, <unset> and <eval> are the Configurable Options



<set> option

<unset> option

<eval> option

splunk> .conf18

In-page Drilldown with Perma-Linking

Enable in-page interaction through UI Editor or editing XML.

6.2 6.3 6.4 6.5 6.6

Drilldown Link Dashboard

Enable link to dashboard action thro UI Editor or editing XML.

6.2 6.3 6.4 6.5 6.6

DASHBOARD DRILLDOWN EDITOR

IN-PAGE DRILLDOWN & LINK TO ANOTHER DASHBOARD

splunk> .conf18

```
<dashboard>
 <label>predefined-token-drilldown</label>
   <row>
     <panel>
       <table><title>Drilldown to http://answers.splunk.com</title>
         <search>
           <query>
         index=_internal | stats count by sourcetype | sort -count
           </query>
         <earliest>-60m</earliest>
         <latest>now</latest>
         </search>
         <drilldown target="blank">
           <link>
         http://answers.splunk.com/search.html?q=$click.value$
           </link>
         </drilldown>
       </table>
```

$click.value$

PREDEFINED TOKENS DEMO

splunk> .conf18

Step 3: Forms Custom Tokens & Simple XML

Interactivity Based on Custom Tokens (*including Auto Generated*)

splunk> .conf18

```
<form>
  <label>JavaScript How To Video</label>
  <fieldset submitButton="false">
    <input type="dropdown" token="product_name">
      <label>Select Product</label>
      <search>
        <query>sourcetype=access_combined product_name=*
          | dedup product_name
        </query>
        <earliest>-7d@h</earliest>
        <latest>now</latest>
      </search>
      <fieldForLabel>Product Name</fieldForLabel>
      <fieldForValue>product_name</fieldForValue>
    </input>
  </fieldset>
  <row>
    <panel>
      <table>
        <search>
          <query>sourcetype=access_combined product_name=$product_name|s$
            | stats count(action) as "Action Count" by action | rename act
          </query>
          <earliest>-24h</earliest>
          <latest>now</latest>
        </search>
```

Custom Token

```
<dashboard>
 <label>custom-token-show-panel</label>
 <row>
  <panel>
   <table> <title>Event counts by sourcetype</title>
    <search>
     <query>index=_internal  | stats count by sourcetype | sort -count</query>
    </search>
    <drilldown>
     <set token="show_panel">true</set>
     <set token="selected_value">$click.value$</set>
    </drilldown>
   </table>
  </panel>
  <panel depends="$show_panel$">
   <event><title>Recent events for $selected_value$</title>
    <search>
     <query>index=_internal sourcetype=$selected_value$</query>
```

Show table based on existence of one or more tokens

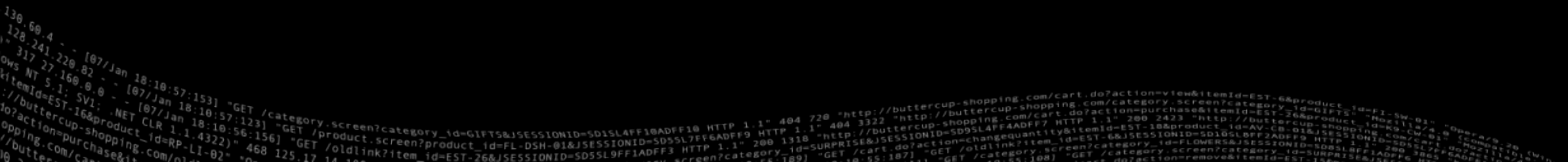
```
<table depends="$showTable$,$selected_sourcetype$">
   <option name="foo">bar</option>
</table>
```

CUSTOM TOKENS DEMO - DASHBOARD

splunk> .conf18

Poll Question

When are **tokens automatically generated** for you?



When are **tokens automatically generated** for you?

Answer: **Form Inputs**

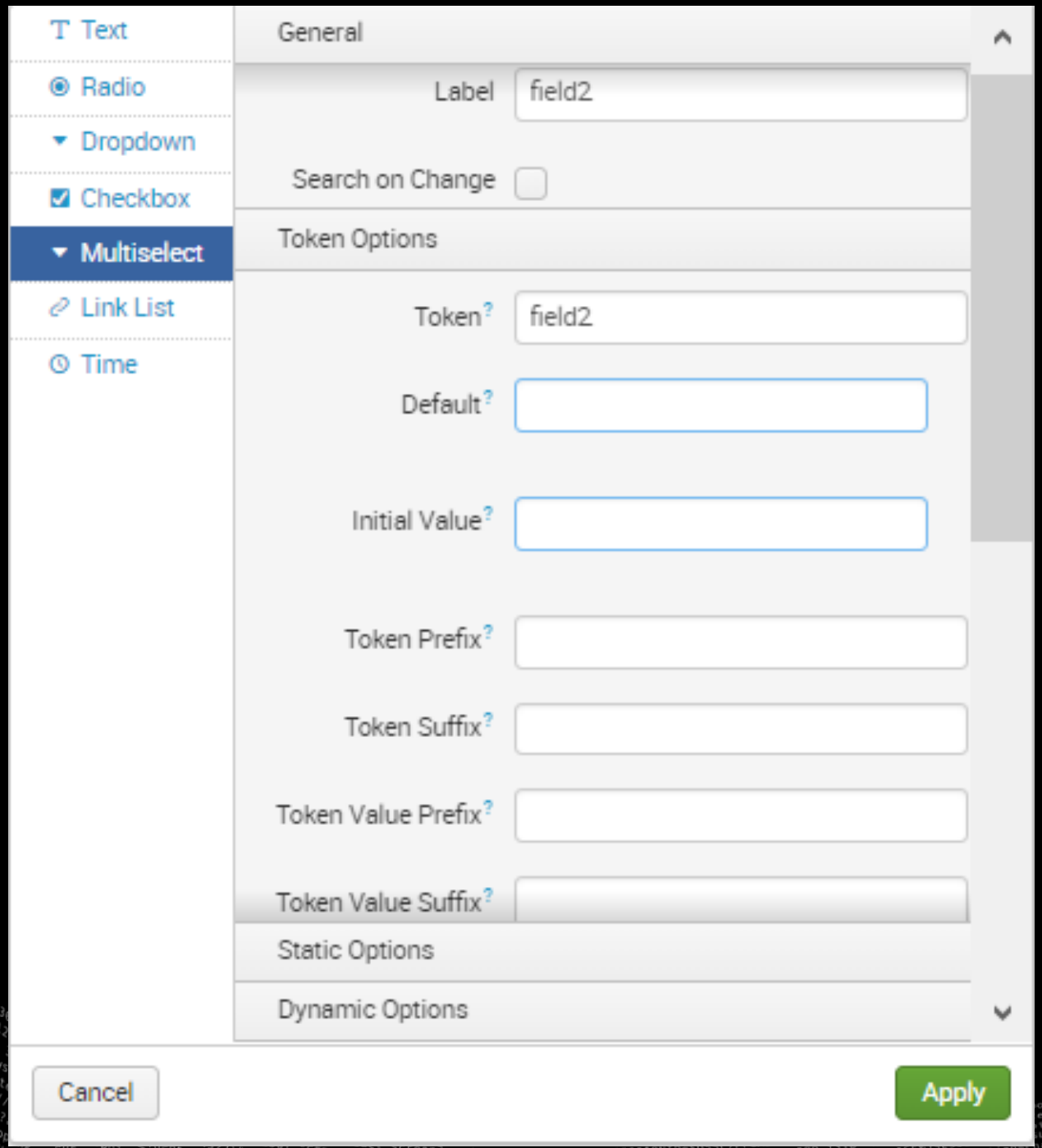
When you add a form input to a dashboard, the dashboard is transformed into a form, and a token is generated automatically

Auto Generated Tokens

Placing a Form Input onto a Dashboard Automatically Generates a Token

- **When you add an input to a form, a token is generated automatically**
  - *You can customize the token name*
- **You have to put the plumbing in, the auto generated token will not do anything without some configuration or editing of the Simple XML by you**
  - *The token must be populated with some value that you can then use to perform an action*
- **Although the token in auto generated for you, it is really just a convenience and is exactly like a custom token**
  - *An auto generated token does not automatically do anything*

Form Editor



Form inputs (forms only)

<fieldset>
<input>

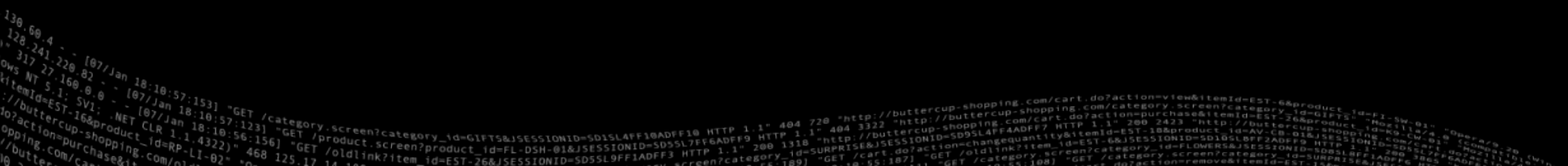
- **<text>**
- **<checkbox>**
- **<dropdown>**
- **<multiselect>**
- **<radio>**

<search> (to populate input choices)

Form Input - Cascading Dropdowns

```
<input type="dropdown" token="Country" searchWhenChanged="true">
<search><query>... | stats count by Country

<input type="dropdown" token="Region" searchWhenChanged="true">
<search><query>... | stats count by Region

<input type="dropdown" token="City" searchWhenChanged="true">
<search><query>... | stats count by City


<table>
<search><query>... | stats list(count), values(categoryId) by Country Region City
<option name="drilldown">cell</option>

<map>
<search><query>... Country=$Country|s$ Region=$Region|s$ City=$City|s$ | geostats count by categoryId
<option name="drilldown">none</option>
```

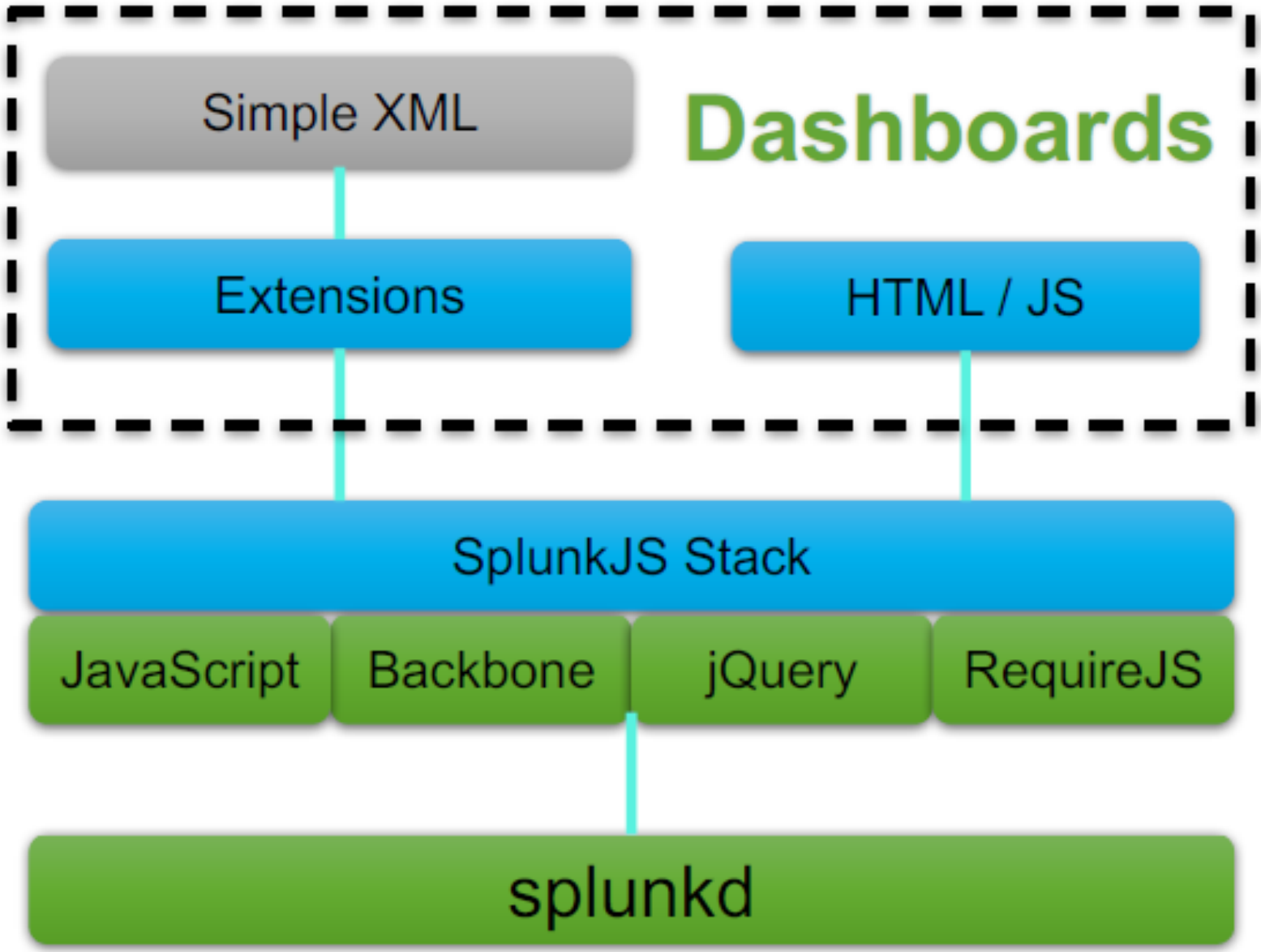
CUSTOM TOKENS DEMO - FORMS



splunk> .conf18

Step 4: Simple XML & JavaScript Extensions

Interactivity Based on JavaScript Extensions



JavaScript Extensions

Directory location: Where to place the JavaScript file.

```
Splunk/etc/apps/$app$/appserver/static/
```

ALWAYS. ALWAYS. ALWAYS,
start the RequireJS block with “splunk/mvc” and
end the RequireJS block with “splunk/mvc/simplexml/ready!”

```
require([
    "splunkjs/mvc",
    "splunkjs/mvc/textinputview",
    "splunkjs/mvc/simplexml/ready!",
    ],
```

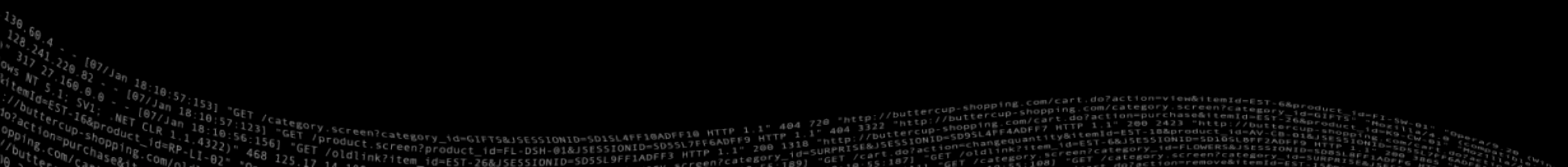
form-multiselect.xml

```
<input id="multi1" type="multiselect" token="release_year" searchWhenChanged="false">
    <valuePrefix>release_year="</valuePrefix>
     <valueSuffix>"</valueSuffix>
     <delimiter> OR </delimiter>

<input type="dropdown" token="genre_id" searchWhenChanged="false">

<input type="dropdown" token="orig_ln" searchWhenChanged="false">
```

multiselect.js

```
require([
'jquery',
'underscore',
'splunkjs/mvc',
'splunkjs/mvc/simplexml/ready!'
],
function($,_,mvc){
        var multi1 = mvc.Components.get("multi1")
        multi1.on("change",function(){
                current_val = multi1.val()
                console.log("Current Vals: " + current_val)
                var first_choice_value = multi1.options.choices[0].value;
                if (current_val.length > 1 && current_val.indexOf(first_choice_value) == 0) {
                        multi1.val(_.without(current_val, first_choice_value));
                }
                if (current_val.length > 1 && current_val.indexOf(first_choice_value) > 0) {
                        multi1.val([first_choice_value]);
```

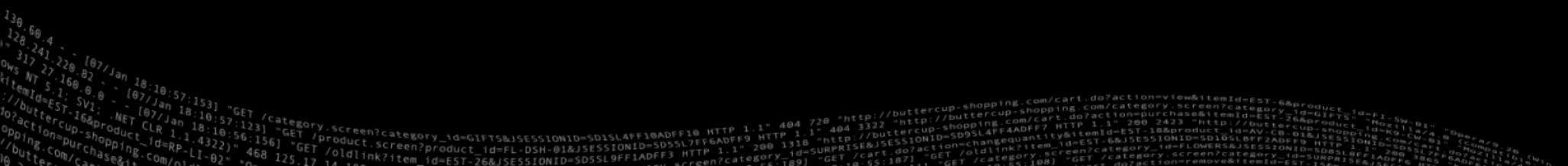
JAVASCRIPT EXTENSION DEMO



splunk> .conf18

Poll Question

Can you name any problems you might solve with Simple XML, custom tokens, & JavaScript extensions?



splunk> .conf18

Step 5: Simple XML, INLINE HTML & JavaScript Extensions

Interactivity based on manipulation of INLINE HTML with JavaScript Extensions

INLINE HTML

Typically, you will insert INLINE HTML inside a Simple XML <row>.

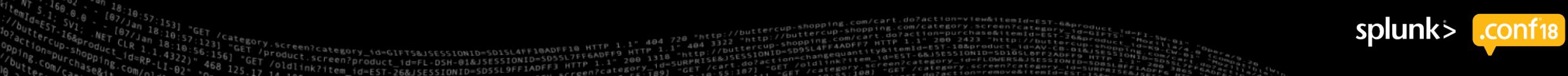
```
<row>
  <html>
  <div id=”htmltable”>
    <table>
      <tr>
        <td><img src = " /static/app/is_app_one/graph.png" /></td>
        <td>
          <p>Lorem ipsum ...</p>
          <p>Nulla ut congue ...</p>
          <p>Etiam pharetra ...</p>
        </td>
      </tr>
    </table>
  </div>
</html>
</row>
```

HTML Custom Button (Reset)

```
<html>
        <center>
        <button type="button" id="buttonId" class="btn">Reset</button>
        </center>
</html>
```

```
require([
    'jquery',
    'splunkjs/mvc',
    'splunkjs/mvc/simplexml/ready!'
], function ($, mvc) {
  var tokens = mvc.Components.get("default");
  tokens.on("change:app", function() {
    $('#buttonId').on("click", resetAppToken);
  });
  function resetAppToken(){
    tokens.set("form.app", "*");
  }
});
```

INLINE HTML & JAVASCRIPT EXTENSION DEMO



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Step 6: Splunk Application Development without Simple XML

Many, many different Splunk Development Options

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Next Steps: Roadmap For New Token Masters

- **Convert Simple XML to HTML code** and leverage JavaScript extensions
- Splunk **Add-ons to Splunk Web**
- Splunk Certified **Applications for Splunk Web**
- Splunk **Applications (entirely custom GUI, does not run in Splunk Web)**

- Splunk **Rest APIs**
- Splunk **SDKs** (JavaScript, Java, Python, C#)
  - Manage Splunk configurations and objects.
  - Integrate search results into your applications.
  - Log directly to Splunk.
  - Present a custom UI

Dynamic Columns

```
<div class="input input-radio" id="input1">
----------------------------------------------------------------------
    var input1 = new RadioGroupInput({
      "id": "input1",
        "choices": [
            {"value": "pickme", "label": "Pick Me"},
            {"value": "instantmillions", "label": "Instant Millions"}
        ],
        "default": "pickme",
        "searchWhenChanged": true,
        "selectFirstChoice": false,
      "value": "$form.field1$",
      "el": $('#input1')
    }, {tokens: true}).render();
```

100% CONVERTED TO HTML DEMO

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Boundaries

- **Boundary 1: No need for dashboards.**
  - Event searches and reports suffice
- **Boundary 2: No need for forms.**
  - Default behaviors of dashboards suffice
- **Boundary 3: No need for custom user interfaces.**
  - Default behaviors of forms suffice
- **Boundary 4: No need to insert some HTML capabilities not available in Splunk Web.**
  - JavaScript extensions with Simple XML provides adequate user interface customization
- **Boundary 5: No need for traditional web development with HTML, CSS, & JavaScript**
  - JavaScript extensions with INLINE HTML does what Simple XML cannot do

Q&A

Mike Deane | Speaker

Mike Deane

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321-652-8356

RED ALPHA

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Join the Pony Poll

ponypoll.com/***

Thank You

Don't forget to rate this session in the .conf18 mobile app

BONUS

INLINE HTML enables easily formatting blocks of text.

```
<dashboard>
  <row>
    <panel>
      <html>
        <div style="text-align: left;">
                                This is Splunk dashboard text that spans
across
                                <br>multiple lines.</br>
        </div>
        </html>
    </panel>
  </row>
  <row>
    <panel>
      <html>
        <div style="text-align: center;">
          <h1>
                                This is text centered above a chart.
          </h1>
        </div>
        </html>
    </panel>
  </row>
  <row>
    <panel>
      <single>
        <search>
          <query>.....</query>
          <earliest>0</earliest>
          <latest></latest>
        </search>
      </single>
    </panel>
  </row>
</dashboard>
```