Creating Content Packs in vRealize Log Insight 2.5

TECHNICAL WHITE PAPER

vmware®

Table of Contents

Introduction

Content packs are read-only plug-ins to vRealize™ Log Insight™ that provide pre-defined knowledge about specific types of events such as log messages. The purpose of a content pack is to provide knowledge about a specific set of events in a format that is easily understandable by administrators, engineers, monitoring teams, and executives. A content pack should answer questions like, *"Is the product/application healthy?"* In addition, a content pack should create a greater understanding of how a product/application works.

A content pack comprises information that can be saved from either the Dashboards or Interactive Analytics pages in Log Insight. This includes:

- Queries
- Fields
- Aggregations
- Alerts
- Dashboards

By default, the current version of Log Insight ships with the vSphere and General content pack. Other content packs can be imported as required. In addition, any Log Insight user can create a content pack for private or public consumption.

Intended Audience

This paper provides information about each piece of information that can be saved in a content pack, as well as best practices for content pack creation. The information provided is specifically tailored to content pack authors using Log Insight 2.5.

Getting Started

Before creating a content pack, it is important to understand some concepts regarding the content pack workflow. The tips in this section will make creating and maintaining content packs easier.

Instance

Content packs are read-only plug-ins to Log Insight, which means imported content packs, cannot be edited. The easiest way to edit a content pack is to modify the saved definitions on the instance of Log Insight that was used to initially create the content pack. The original instance should be backed up to prevent data loss or corruption. If the instance used to create the content pack is lost and no backup exists, the content pack must be recreated on a new instance. Although certain components of a content pack can be cloned into a custom dashboard, also known as user space, doing so is not a recommended way to edit a content pack and might result in a content pack that is dependent on a separate content pack.

Alternatively, you can import a content pack into My Content (user space) and edit the content pack. However, if you have other widgets (dashboards, alerts, extracted fields and queries) from before you do the import, ensure you save and remove them before you import to avoid mixing of original content with the imported content.

User

Content packs are created in part from the content saved under Custom Dashboards, or more specifically either My Dashboards or Shared Dashboards on the Dashboards page. When exporting a content pack, everything within the selected custom dashboard is exported. For this reason, it is recommended that every individual content pack be authored by a separate user entity in Log Insight. For information on creating users in Log Insight, please refer to the Log Insight in-product documentation.

Events

It is essential to collect relevant events before attempting to create a content pack, to ensure that the content pack covers all relevant events for a product/application. A common way to collect relevant events is with the assistance of quality assurance (QA) and/or support teams, because these teams usually have access to, and knowledge about, common events. Attempting to generate events while creating a content pack is time consuming and will likely result in missing important events. If QA and support teams are unable to supply events, simulated events can be used instead, assuming that product/application events are known and/or documented.

Once appropriate logs have been collected, they must be ingested into Log Insight. Although not supported in the current version of Log Insight, it is possible to ingest events from the command line using the same process as the archive import process described in the *Log Insight Installation and Administration Guide*. In short, any file, directory, tarball, or ZIP file can be ingested by copying the events to the Log Insight virtual appliance and running:
/usr/lib/loginsight/application/bin/loginsight repository import /path/to/events OR
/usr/lib/loginsight/application/bin/loginsight repository import –f <tag-name=value> /path/to/events.
Although this process is not supported, it does work and is recommended when creating a content pack.

Authors

The authors of a content pack should possess the following competencies.

- Experience using VMware vRealize Log Insight.
- Real-world operating knowledge of the product/application.
- Understanding of and ability to generate optimized regular expressions.
- Experience with using logs to debug multiple problems with the product/application.
- Support background, with exposure to a variety of problems.
- System administrator background with previous syslog experience.

Queries

Log Insight allows queries to retrieve and summarize events. Queries can be created and saved from the Interactive Analytics page. A query comprises one or more of the following:

- Keywords: Complete, or full-text, alphanumeric and/or hyphen matches.
- Globs: Asterisk and/or question mark symbols used to match some quantity of keywords.
- Regular expressions: Sophisticated string pattern matching, based on Java regular expressions.
- Field operations: Keyword, regular expression, and pattern matches applied to extracted fields.
- Aggregations: Functions that are applied to one or more subgroups of the results. Log Insight supports the following types of queries:
- Message: A query formed of keywords, regular expressions and/or field operations.
- Regular expression or field: A query formed of keywords and/or regular expressions.
- Aggregation: A query formed of a function, one or more groupings, and any number of fields. Custom alerts can be defined in Log Insight and are triggered from scheduled queries of any type.

Saving Queries

Queries can be saved using one or more of the following methods:

- Add to Dashboard: Saves the last-run query without time range as a chart, query in a query list, or field table widget in a dashboard group on the Dashboards page.
- Save Current Query: Saves the last-run query with a time-specific time range as a loadable query on the Interactive Analytics page. Queries that are saved using Save Current Query that are exported as part of a content pack do not include any time range.

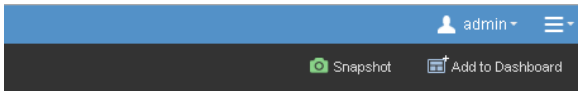


Figure 1. Note the **Add to Dashboard** link just below the navigation bar on the Interactive Analytics page.

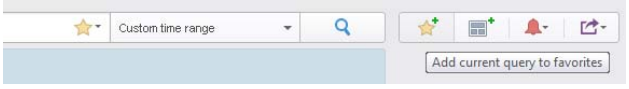


Figure 2. The **Save Current Query…** link under the menu drop-down on the Interactive Analytics page.

The notes section is very important and should be populated for every query. Information can be added as text, a link to documentation, a knowledge base article, or a forum. Information provided should answer the following questions:

- Why is this widget important?
- What is a "good" and a "bad" value?
- Where can more information be obtained?

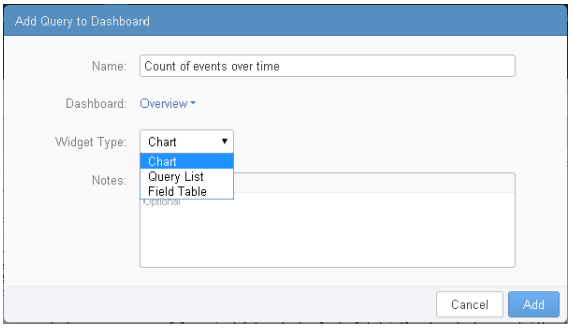


Figure 3. Add to Dashboard dialog box with notes section.

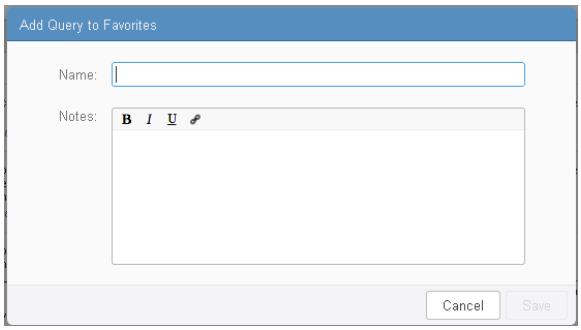


Figure 4. Save Current Query dialog box with notes section.

Message Queries

Message queries can be entered using one or more of the following methods:

- Search bar: The search bar is one way to refine the results that are returned, given the existing events in a Log Insight instance. Although a constraint can be used instead of the search bar, it is often easier to understand a query that leverages the search bar over an equivalent constraint. As such, best practice is to use the search bar whenever possible, instead of an equivalent constraint.
- Constraints: A constraint allows querying using a regular expression, a field, logical OR and AND operations, or a combination of search bar and constraint queries.

Figure 5. An example of the search bar with a keyword and a constraint with an equivalent query. Using the search bar is preferential.

Figure 6. An example of the search bar with a keyword, a constraint with a regular expression, and a constraint with a field operation. In order for the query to return a result, all three items need to return a match.

Although query building is beyond the scope of this document, there are several important things to know about the search bar and constraints when creating content packs. In general, the following best practices apply:

- When constructing a query, use keywords whenever possible. When keywords are not sufficient, use globs and when globs are not sufficient, use regular expressions. Keyword queries are the least resource-intensive query type. Globs are a simplified version of regular expression and are the next least resource-intensive type of query. Regular expressions are the most resource-intensive query type and adversely affect query performance.
- Avoid regular expressions whenever possible. If a query can be written without regular expressions, it should be. This is primarily because, from a resource perspective, regular expressions are the most intensive query type. Leverage globs instead of regular expressions when keywords are not sufficient.

- Provide as many keywords as possible. When using regular expressions or fields, be sure to include as many keywords as possible. Keywords should be outside any regular expressions, including a logical OR such as (*this*|*that*). Regular expressions use a lot of resources. Keyword queries are the least resource-intensive query type and Log Insight is optimized to implement keyword queries before regular expressions, to minimize regular expression overhead.

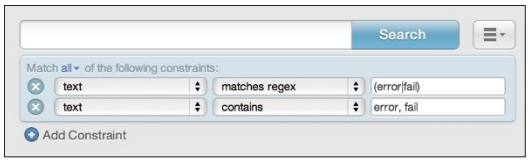


Figure 7. An example of two different ways to construct the same query. The first constraint is a regular expression. The second is a keyword, comma separated, logical OR match. The second constraint is always preferred over the first.

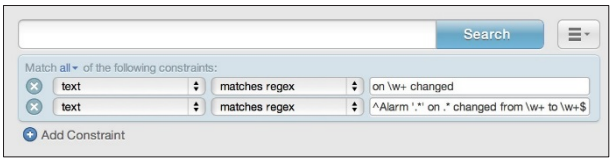


Figure 8. An example of two different ways to query for the same field. The first constraint is generic and contains only two keywords. The second constraint is specific and has five keywords. The second constraint is always preferred over the first.

Field Queries

Fields are a powerful way to add structure to unstructured events and allow for the manipulation of both the textual and visual representation of data. Fields are one of the most important items in a content pack because they can be used in multiple ways including:

- Aggregations: Allowing for functions and groupings to be applied to fields.
- Constraints: Allowing for operations to be performed against fields.

Any part of a log message that might be applicable to a query or aggregation should be extracted. Fields are a type of regular expression query and are especially useful for complex pattern matching, so a user does not need to know, remember, or learn complicated regular expressions.

- Regex before value: This field should include as many keywords as possible. If the field is empty or only contains special characters, the *Regex after value* must include keywords.
- Regex after value: This field should include as many keywords as possible. If this field is empty or only contains special characters, the *Regex before value* must include keywords.
- Name: Only use alphanumeric characters. Ensure that all characters are lower case and use underscores instead of spaces as this makes fields easier to view. Important: Names for content pack fields and user fields can be the same, although content pack fields will have a namespace in parenthesis to the right of the field name. It is recommended to prefix content pack fields with an abbreviaton (e.g. vmw_) to avoid confusion.

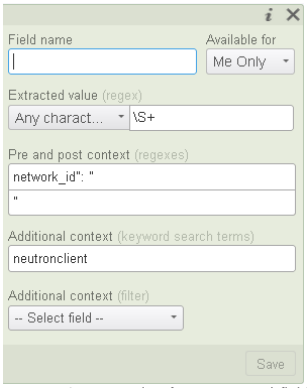


Figure 9. An example of an extracted field definition with multiple keywords.

- Additional context: From vRealize Log Insight 2.5 onwards you can also add keywords to a field called Additional context (keyword search terms,) to further refine your search and improve query performance.
- Additional context: From vRealize Log Insight 2.5 onwards you can also add a filter on a static field as additional context (filter) with an operator and value, to further refine your search and improve query performance.

In addition to the various components that comprise a field, several best practices must be considered. These include:

- Only create fields for regular expression patterns. If a field can be queried using keyword queries, use keyword queries instead of a pre-defined field. Fields are intended to add structure to unstructured data and to provide a way to query specific parts of an event.

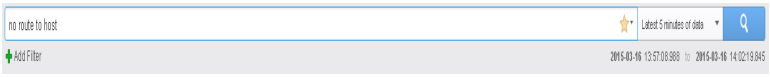


Figure 10. The recommended way to query for keyword matches. Information entered into the search bar or a constraint can also be saved for future usage by clicking the menu drop-down next to the Search button and selecting Save Current Query.

- Only create fields for regular expression patterns that return a fraction of the total events. Fields that match most events and/or return a very large number of results are not a good candidate for field extraction because the regular expression will need to be applied to a large volume of events, resulting in a resource-intensive operation.

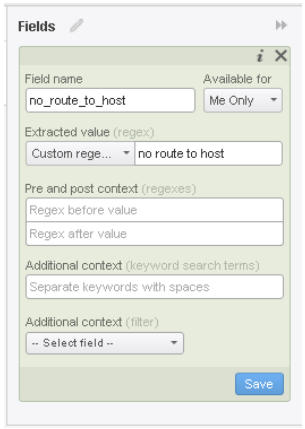
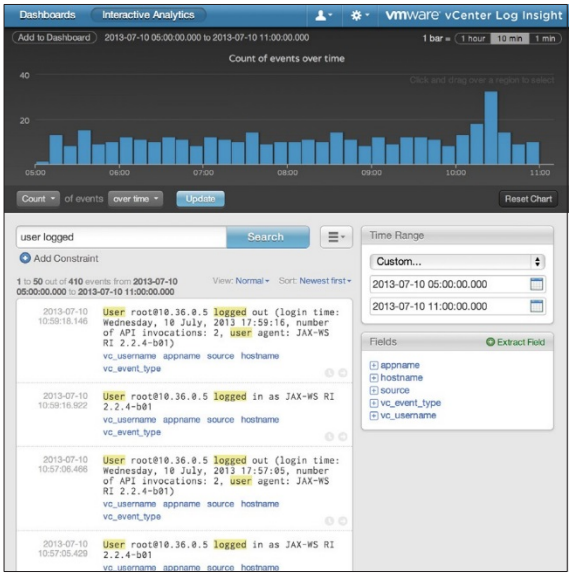


Figure 11. An example of a keyword field. Since this query can be constructed without a regular expression, it is not a good candidate for field extraction.

Orphaned Fields

It is common for queries to contain one or more fields. For saved queries, it is important to note that the field definition used when a query is saved is always maintained. This means that, if a query is saved with a field and that field is later modified, the query will be modified when you update the field definition. In fact, if the field is used in other widgets such as dashboard chart or alert queries, those queries are also updated. Field modifications include:

- The *value* of the field is changed.
- The *regex before value* and/or the *regex after value* of the field is changed.
- The *name* of the field is changed.
- The *additional context* of the field is changed.
- The field is deleted.



g

Figure 12. An example of running a query with an orphaned field. Notice that the overview chart is grouped by security_host and the security_host field definition is open under the Fields section. This means the field does not exist in the Log Insight instance, but does exist as part of a chart widget or saved query.

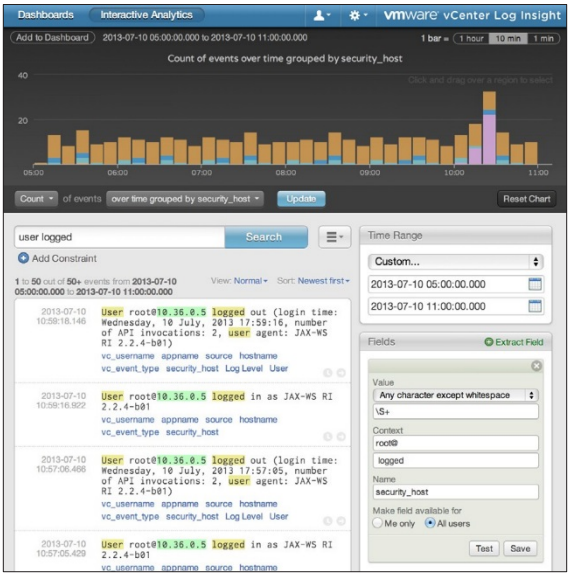


Figure 13. An example of what happens when an orphaned dialog box is closed. Notice how the search bar remains the same, but the overview chart is no longer grouped by security_host. In addition, security_host is not listed under the Fields section.

It is critical for saved queries that leverage a field to be recreated if the field is modified. If a previously saved query is not updated when a field it relies on is deleted, the saved query will contain an orphaned field. An orphaned field is a field that exists in a saved query, but does not exist as an available field. Orphaned fields are visible when running a saved query in the Interactive Analytics page, because the namespace *(Temporary)* appears next to the field name in the Fields section. Important: Saving, deleting, or modifying the field results in any use of the orphaned field being removed from the query.

Ensure that content pack queries do not contain orphaned fields. If an orphaned field is found, recreate the saved query and delete the old saved query to remove the orphaned field. To remove an orphaned field from a chart widget:

1. Go to the widget on the Dashboards page.
2. Select the *Edit in Interactive Analytics* gear button within the widget.
3. Modify the field(s) used.
4. Select the *Save followed by Return to Dashboard* button on the Interactive Analytics page.

Aggregation Queries

Log Insight allows visual manipulation of events through the use of aggregation queries. An aggregation query is made up of two district attributes:

- Functions
- Groupings

In content packs, groupings are the most important consideration, but both functions and groupings will be addressed as they impact how charts are displayed. An aggregation query requires one function and at least one grouping.

Bar Charts

By default, the Interactive Analytics page of Log Insight displays a count of events over time in the overview chart. If the count function is used in conjunction with the time series grouping, a bar chart is created.

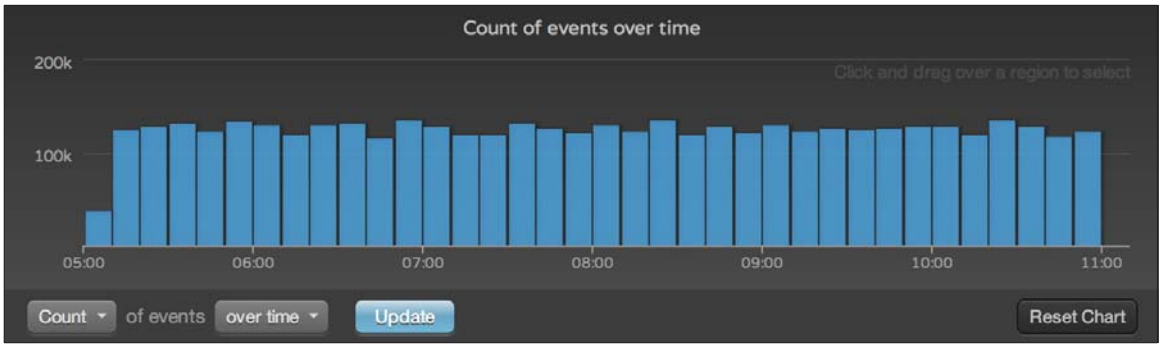


Figure 14. An example of a bar chart using count of events over time.

If the count function is used in conjunction with a single field grouping instead of time series, a bar chart is created with quantities listed from greatest to least.

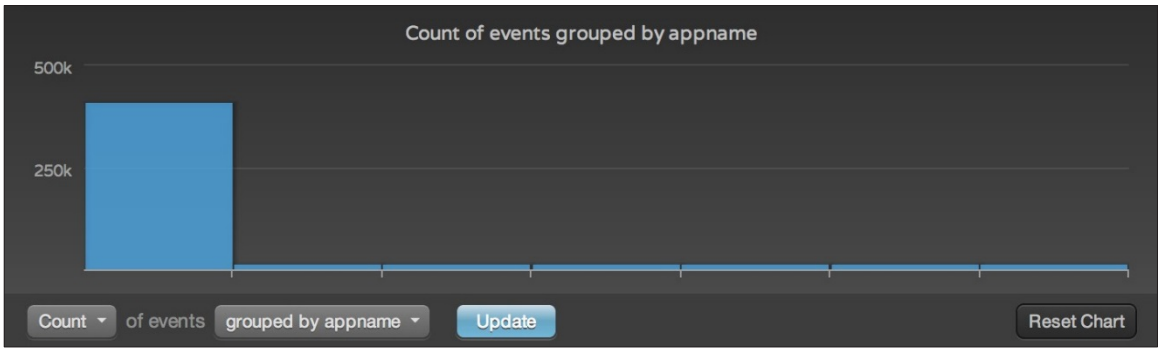


Figure 15. An example of a bar chart using count of events grouped by a field.

Line Charts

All functions, except the count function, are mathematical and require a field against which to apply the equation. When performing a mathematical function on a field and grouping by time series, a line chart is created.

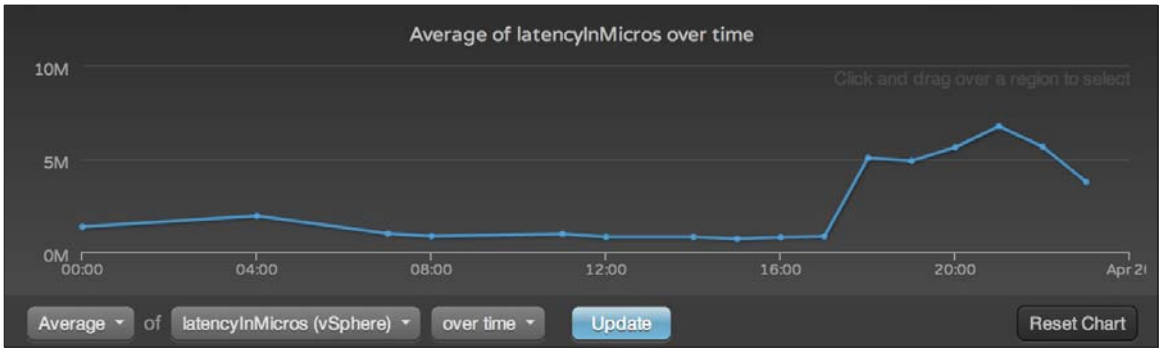


Figure 16. An example of a line chart using average of a field over time.

Stacked Charts

By default, the overview chart on the Interactive Analytics page of Log Insight is a count of events over time. If one field is added to the time series grouping, a stacked chart is created.

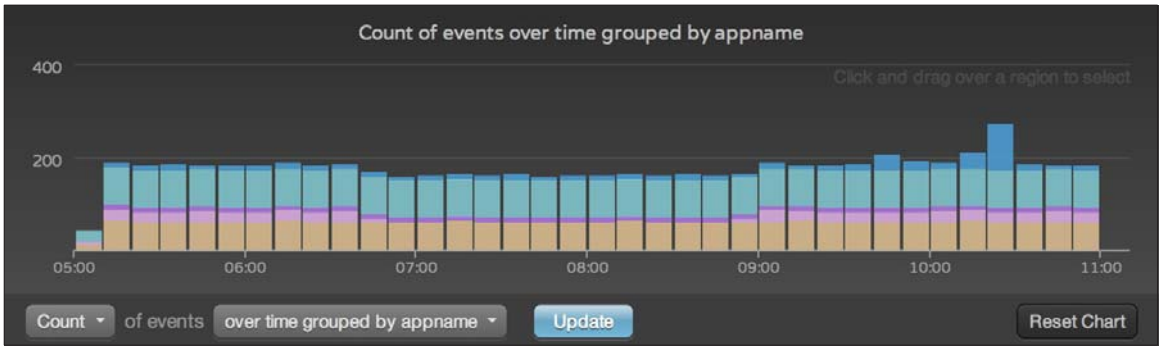


Figure 17. An example of a stacked bar chart using count of events over time with a field.

If grouping by time series, and a field and any function other than count is used, a stacked line chart is created.

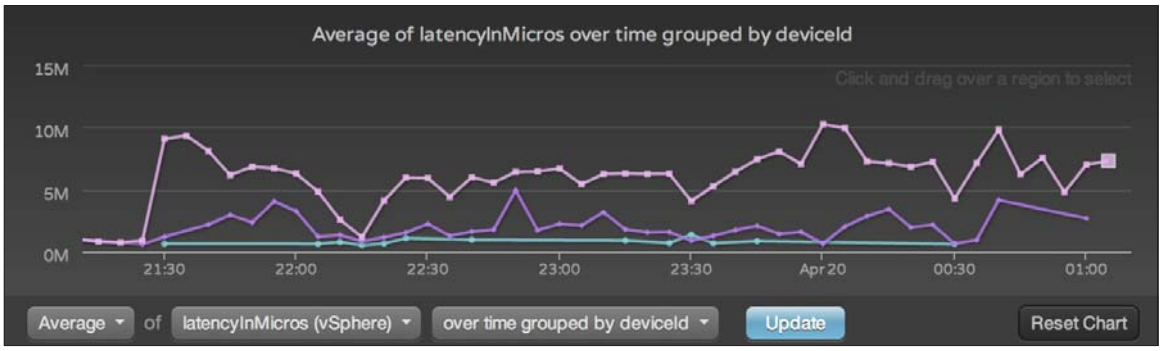


Figure 18. An example of a stacked line chart using average of a field over time grouped by a field.

Stacked charts are powerful when attempting to find anomalies for an object. Consideration needs to be given to the number of objects that could be returned. In general, the following best practices apply:

- If the number of objects per bar returned will be less than ten, stacked charts are encouraged.

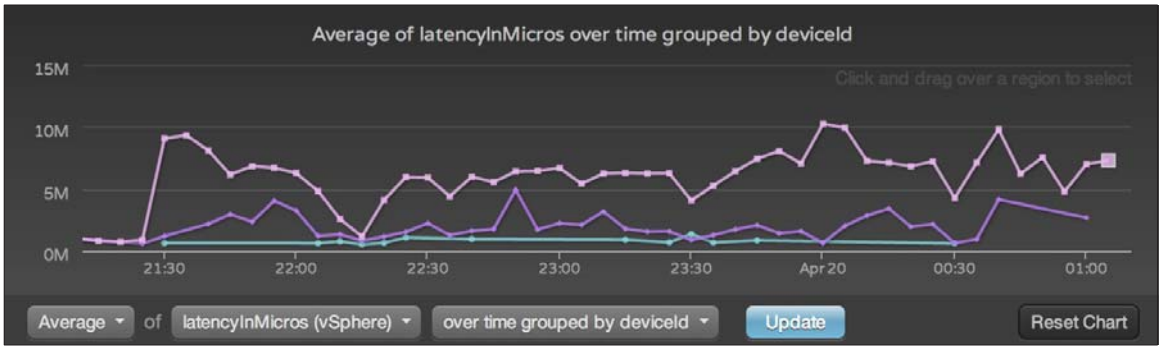


Figure 19. An example of a stacked line chart with a small number of objects.The chart is easy to read and understand.

- If the number of objects returned per bar is or could be 10-20, stacked charts are good, but consideration must be taken when visually representing the chart in a content pack.
- If the number of objects returned per bar is or could be greater than 20, stacked charts are discouraged.

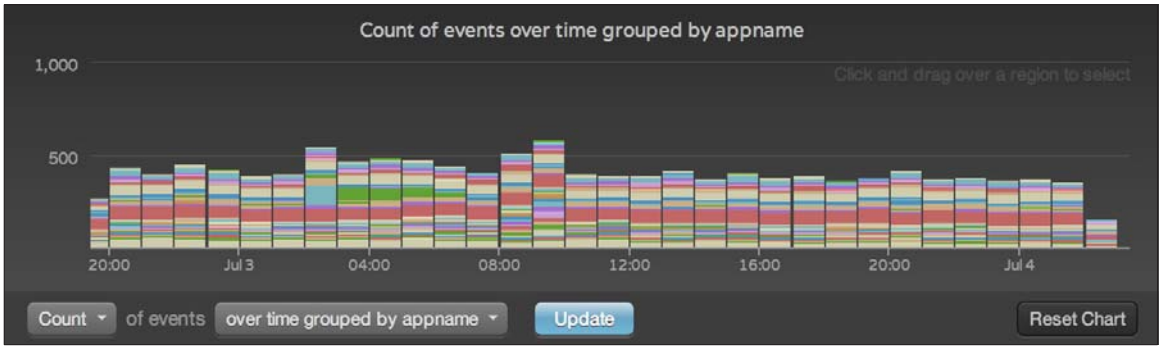


Figure 20. An example of a stacked bar chart with a large number of objects.The chart is hard to read and understand.

The recommendations above are made because a greater number of objects means more resources are necessary to parse and display information. In addition, distinguishing between objects can become challenging when a large number of objects are returned.

Multi-Colored Charts

If a grouping is created using more than one field and time series, a multi-colored chart is created. The chart consists of two colors that interchange. Each interchange represents a new time range. Multi-colored charts can be hard to interpret so consider the value of such a chart before including it in a content pack.

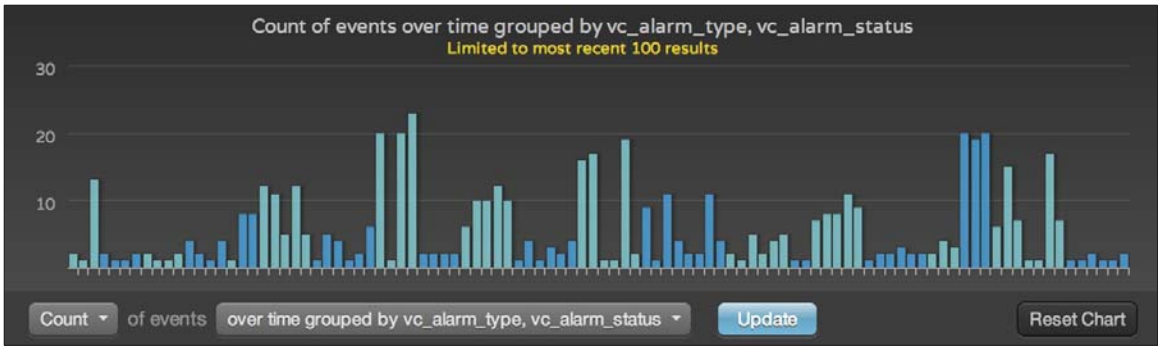


Figure 21. An example of a multi-colored bar chart using count of events over time, grouped by two fields.

When grouping by multiple fields, consider removing the time series for a more easily understood bar chart.

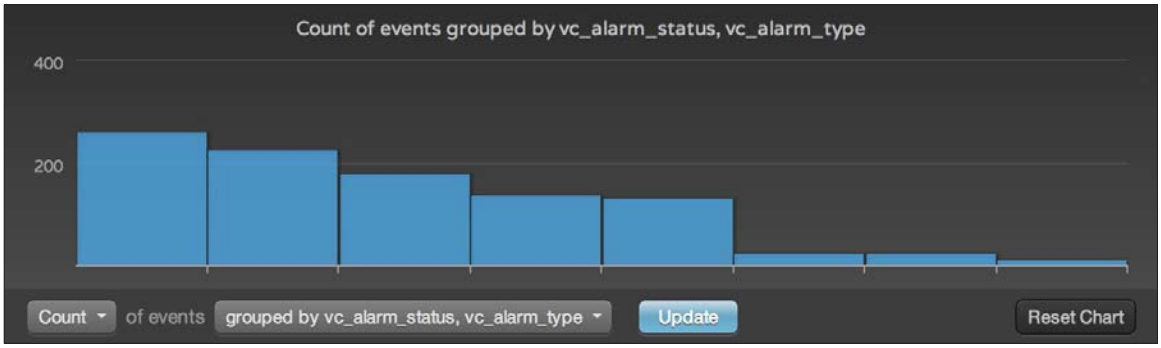


Figure 22. An example of a multi-field grouping bar chart using count of events, grouped by two fields.

If multiple fields are important over a time range, multiple charts could be created for each field individually over the time range. The charts could then be displayed in the same column of a dashboard group in a content pack.

Figure 23. An example of two similar charts stacked. Notice how one red alarm in blue matches mostly pink sources.

Other Charts

Several other chart types are available, including pie and bubble charts. To use these charts, a specific query type is required. If the option for these charts is available, you already have the correct query. If the option for these charts is not available, hover over the chart name you want to use. A pop-up message describes the type of query required for the chart type.

Message Queries

When constructing an aggregation query, the message query should only return results that are relevant to the aggregation query. This makes analyzing easier and ensures only relevant fields are shown.

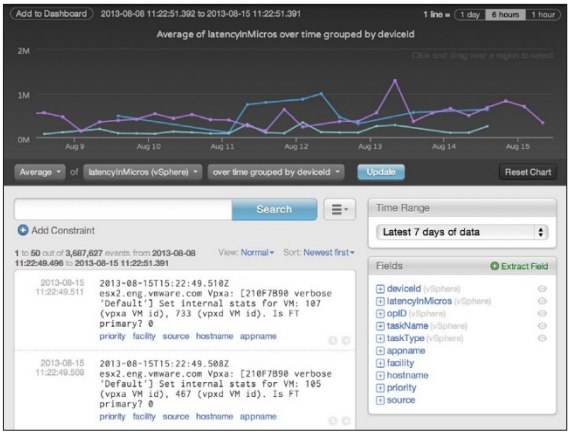


Figure 24. An example of an aggregation query without a message query. This is not recommended.

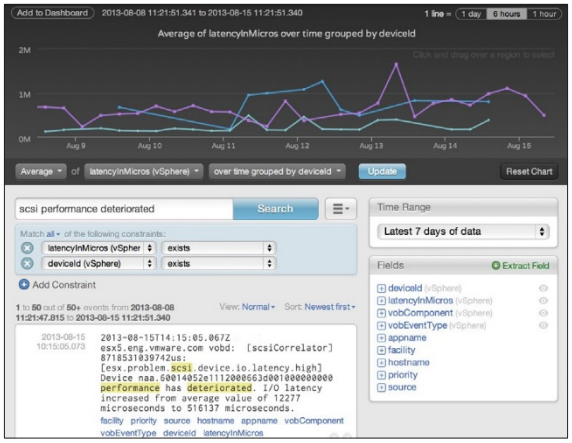


Figure 25. An example of an aggregation query with a message query. This is recommended. Notice the addition of filters for fields in the aggregation query with exists operator.

Alerts

Alerts provide a way to trigger a reaction when a certain type of event is seen. By default, Log Insight supports two different types of alerts:

- Email
- vRealize Operations Manager

Alerts can only be saved in user space and as such, all content pack alerts are disabled by default. If an enabled alert is created and then exported as part of a content pack, the alert is disabled in the content pack. This means that email and/or vRealize Operations Manager settings are not contained and cannot be added to a content pack.

Thresholds

It is important to understand how thresholds work to ensure that, if enabled, a content pack alert does not unintentionally spam a user. When considering a threshold, there are two things to keep in mind:

- How frequently to trigger the alert: Log Insight comes with pre-defined trigger frequencies. Important: Alerts only trigger once for a specific threshold window.
- How often to check if an alert state has occurred: An alert is triggered by a query. Alerts, like queries, are not real-time in the current version. For each threshold window, a pre-determined query frequency is been allocated. Changing the threshold changes the query time.

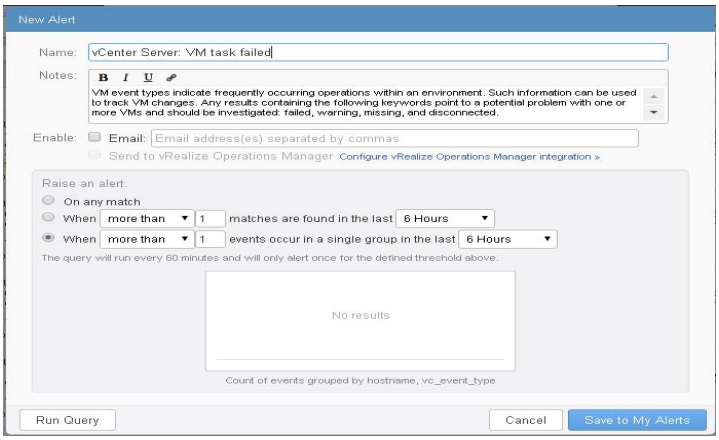


Figure 26. An example of an alert. The threshold has been set to trigger when a type of vCenter Server event for a hostname is seen in the last hour. The query runs every 10 minutes and if the alert triggers, it will not run again for one hour.

Dashboards

Dashboard Groups

A content pack comprises one or more dashboard pages known as dashboard groups.

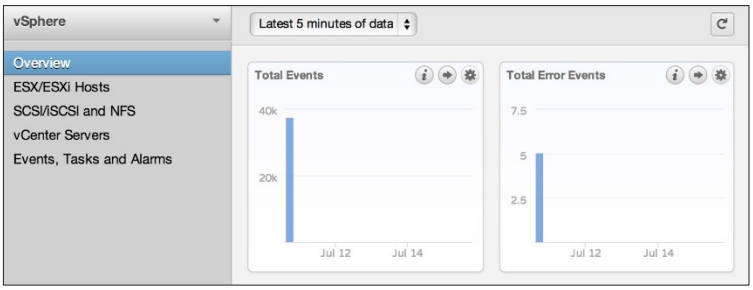


Figure 27. The vSphere content pack. In the left navigation bar, below the name of the content pack, are the dashboard groups.

When creating dashboard groups, the following best practices apply:

- Content packs commonly contain a minimum of three dashboard groups. The best practice is to start with an overview dashboard group to provide high-level information about the events for a specific product or application. In addition to the overview dashboard group, dashboard groups should be created on the basis of logical groupings of events. The logical groupings are product-specific, component-specific or application-specific, but some common approaches are performance, faults, and auditing. It is also common to create dashboard groups per component, such as disk and controller. With the component approach, it is important to note that it is only effective if queries can be constructed to return results from specific components. If this is not possible, the logical approach is recommended.
- When naming dashboard groups, make the title generic and avoid adding product-specific or application-specific names, unless they are being used in a component specific fashion. For example, in the vSphere content pack, the dashboard groups are called *ESX/ESXi hosts* and *SCSi/iSCSI and NFS* instead of *VMware ESX/ESXi hosts* and *VMware SCSI/iSCSI and NFS*.
- A dashboard group should contain a minimum of three, and a maximum of eight, dashboard widgets. With fewer than three dashboard widgets, the volume of knowledge that can be attained by the dashboard group is minimal. In addition, having many dashboard groups with only a limited number of dashboard widgets requires a user to switch between pages and does not provide information in a coherent way. Conversely, greater than eight dashboard widgets per dashboard group can result in the following:
  - Too much information: A user might not know where to begin, or what is most important.
  - Resource intensive: Each widget is a query that must be run against the system.

  When nearing or exceeding eight dashboard widgets in a dashboard group, separate information and create multiple dashboard groups. If a dashboard widget is applicable to one or more dashboard groups, it is recommended to create the widget in each applicable dashboard group.

Dashboard Widgets

There are two different types of dashboard widgets in the current version of Log Insight:

- Chart: contains a visual representation of events with a link to a saved query.
- Query: contains title links to saved queries.

Figure 28. An example of a chart widget.

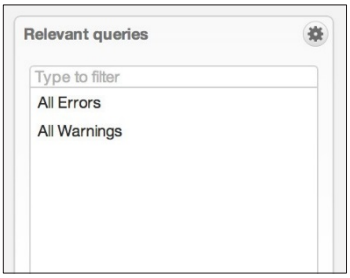


Figure 29. An example of a query widget.

Chart

A dashboard chart widget contains a visual representation of events. A chart can either be represented as a bar or line chart and can be displayed in a stacked fashion. The following best practices apply:

- Charts can contain a lot of information so avoid having more than two chart widgets per row. In some rare cases, three chart widgets can be used effectively, but more than three is strongly discouraged. When determining whether chart widgets are readable or not, use the minimum resolution supported by Log Insight (1024 x 768) because it cannot be assumed that users of the product will have a higher resolution.

Figure 30. An example of three chart widgets in the same row. With additional content, these widgets may become hard to read.

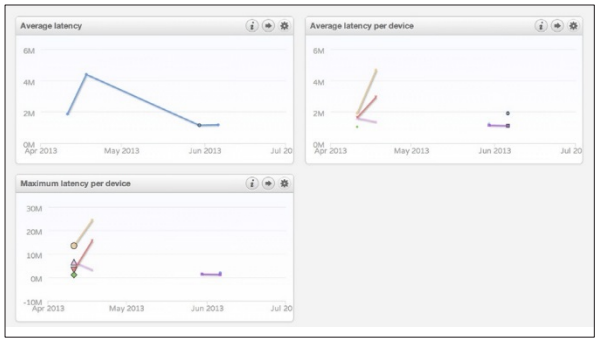


Figure 31. An example of two chart widgets per row. Even with additional content, these charts should be readable.

- If any row, other than the last row, has a single chart widget, it is recommended to make that widget full-width.

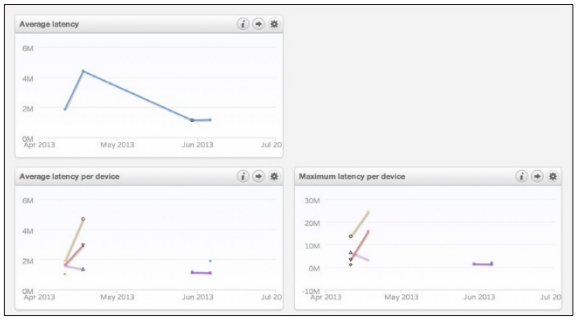


Figure 32. An example with a half-width chart on the top row. This is not recommended.

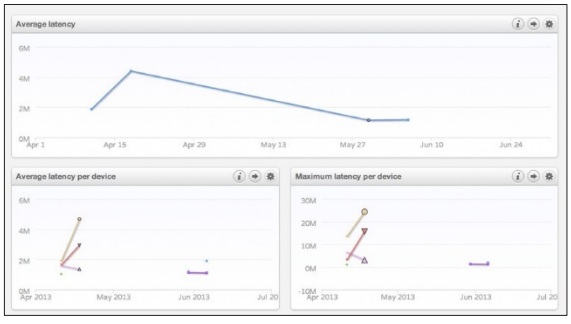


Figure 33. An example of a full-width chart on the top row. This is recommended.

- When naming a chart widget, use a descriptive title and avoid cryptic field names. For example, an extracted field is called *vmw_error_message*. Instead of calling a chart *Count of vmw_error_message*, call it *Count of error messages.*
- Similar charts can be saved and stacked in the same column of a dashboard group for visual comparison. Examples of such charts include:
  - Average X of events over time + Maximum X of events over time. Given the different functions used, it is possible that the Y-axis of the charts will not be the same scale.
  - Count of events over time grouped by X + Count of events over time grouped by Y.

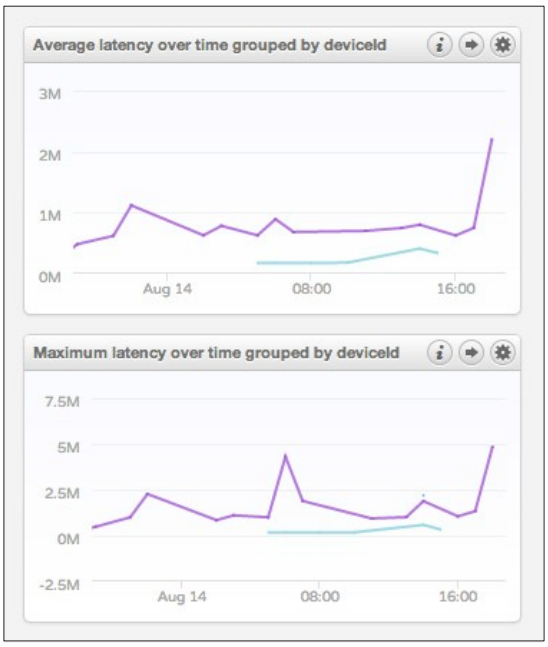


Figure 34. An example of two similar charts using different functions stacked. Notice that the scale of the charts does not match.

Figure 35. An example of two similar charts using different groupings stacked. For this type of query, the scale of the charts matches.

Query

A dashboard query widget contains a title that is a link to a pre-defined query. Query widgets are often used when a chart widget does not provide a significant value, but a query does. Query widgets cannot be created from the Log Insight Web user interface and therefore it is not recommended that they be used in content packs in the current version.

Figure 36. An example of a query widget.

Widgets

Widgets can be modified in a variety of ways including:

- Rename: To rename a widget, select the name of the widget. When naming a chart widget, use a descriptive title and avoid cryptic field names.
- Resize: To resize a widget, hover over the right edge of a widget's contents.

Figure 37. Renaming a widget.

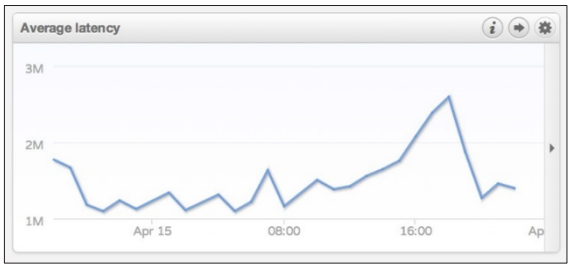


Figure 38. Resizing a widget.

- Move:
  - Within a dashboard group: To move a widget within a dashboard group, select between the title and the action buttons and drag to the new location. Important: It is not possible to create a new row between two existing rows.

Figure 39. Moving a widget within a dashboard group.

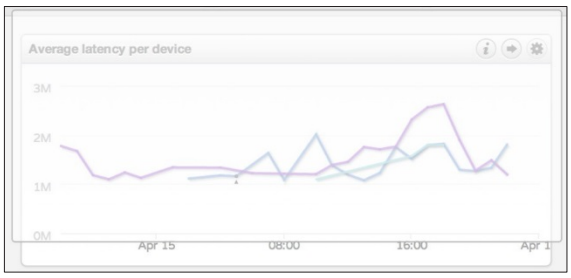


Figure 40. Attempting to add a new row in a dashboard group.

Instead, move the widget to the left-most position of the row below the row desired and move all widgets that follow the new widget down.

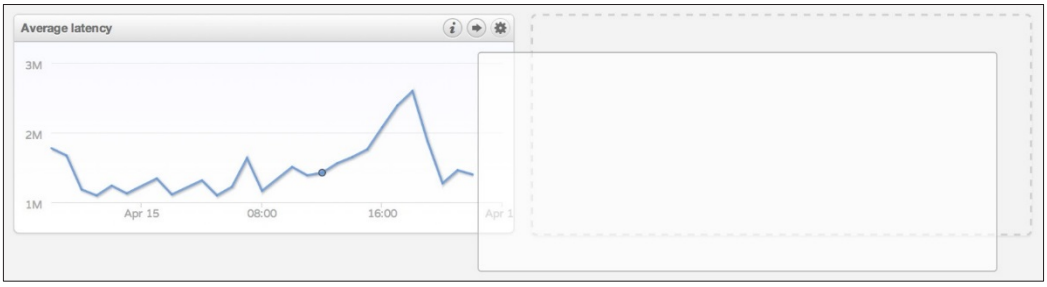


Figure 41. Moving a widget to create a new row in a dashboard group.

  - Between dashboard groups: To move a widget between dashboard groups, click the gear action button and select *Move to Dashboard*.

Figure 42. Moving a widget to a new dashboard group.

- Clone: To clone a widget, click the gear action button and select *Clone*. Important: When cloning a chart widget, any fields that the chart relies on are not cloned. Instead, cloned chart widget fields are defined by the cloned source. For this reason, cloned widgets should not be used in content packs because they might cause content packs to be dependent on other content packs.

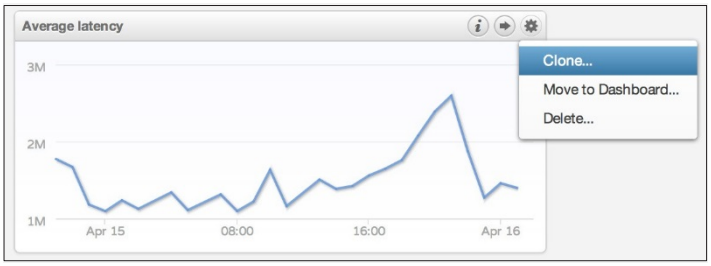


Figure 43. Cloning a widget.

- Edit Information: To edit the notes section of a widget, click the i button and select *Edit*.

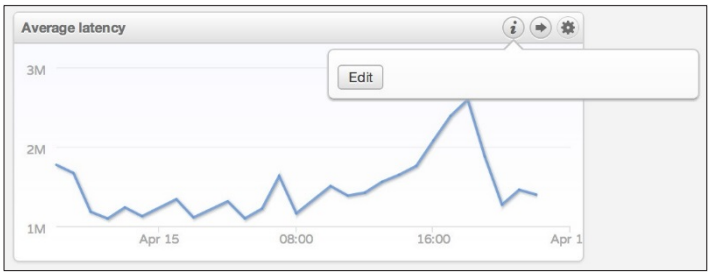


Figure 44. Editing the information field of a widget.

The notes section is very important and should be populated for every dashboard widget. Information that can be added can be text, a link to documentation, a knowledge base article, or a forum. Information provided should answer the following questions:

  – Why is this widget important?

  – What is a "good" and a "bad" value?

  – Where can more information be obtained?

- Edit Chart Type: To change the chart type of a chart widget, click the gear icon of the widget and change the chart type or properties of the current chart type.

- Edit Chart in Interactive Analytics: To change the underlying query of a widget, click the gear icon of the widget and select the menu to modify the widget's query in interactive analytics.

The underlying query for a widget can be modified. In order to change the underlying query, use the *Edit Chart in Interactive Analytics* menu. For chart widgets, the directions are:

1. Go to the widget on the Dashboards page.
2. Select *Edit in Interactive Analytics* within the widget from the gear menu.
3. Modify the query as required.
4. Click the *Save button* on the Interactive Analytics page.
5. Click the *Return to Dashboard menu* from the bottom of the Interactive Analytics page.

Content Packs

With an understanding of what comprises a content pack and the best practices when performing each operation, it is now time to view, export, import, edit, and publish the content.

View

To view saved content:

1. Navigate to the *Content Packs* section by clicking the gear icon in the navigation bar and selecting Content Packs.

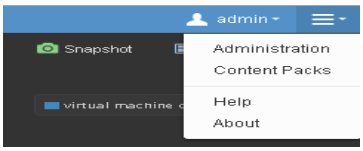


Figure 45. Content Packs menu option. Important: The Administration option will only be visible to Admin users.

2. Select where the content was saved. For content pack authors, content is saved under *Custom Content* and, if following the best practices described in the Getting Started section of this document, saved content will appear under *My Content*.

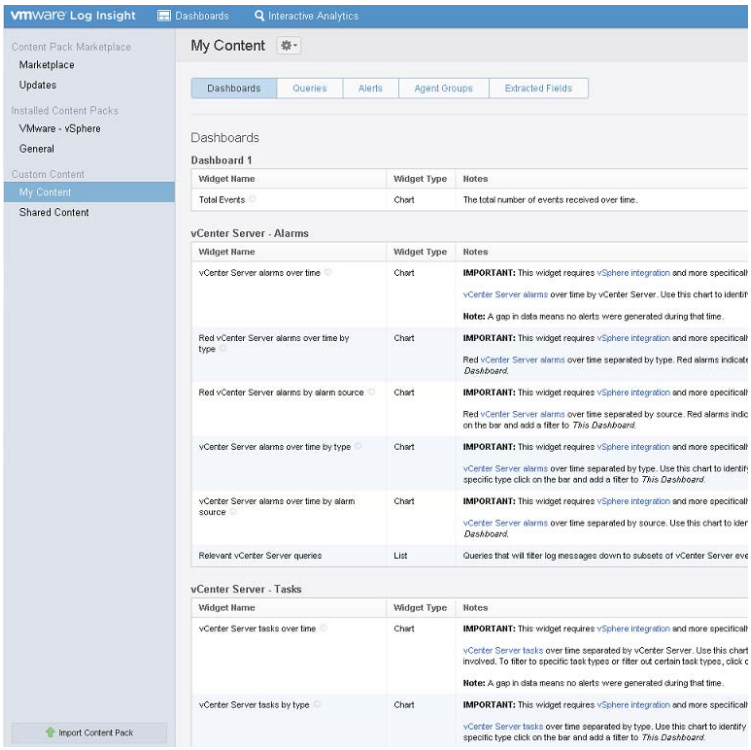


Figure 46. An example of saved content.

In general, a content pack should have:

- Three or more dashboards (dashboard groups)
- Three or more queries (chart/table widgets) per dashboard (nine or more in total)
- Five or more alerts
- Twenty or more extracted fields

Export

Private

To export all information saved in a dashboard for private use:

- Select the content, then click the gear icon to the right of the dashboard name.
- Select *Export*.
- Give the content pack a name. The recommended format is: <*Company*> – <*Product*> *v*<*Version*> (E.g. VMware – vSphere v1.0). Ideally, the content pack name should be less than 30 characters to prevent word wrapping.
- (Optional) Give the content pack a namespace of the format com.<*company name*>.<*product name*>. After a content pack is published DO NOT change the namespace because a user who is upgrading content packs will get a new copy of the content pack instead of an in-place upgrade.
- Give the content pack a version number in the format *MAJOR.MINOR.REVISION*
  * MAJOR - many changes to the content pack, for example one or more new dashboards
  * MINOR - fixed a bug, changed a widget type, maybe added one or two widgets
  * REVISION - for content pack authors, when preparing a new version to send to VMware with the revision set (starting from 1). Every time feedback is given and another revision needs to be validated, the revision number is incremented. When the content pack is published officially, it does NOT include a revision number.
- (Optional) Give the content pack an author name. (The company publishing the content pack, e.g. VMware Inc.)
- (Optional) Give the content pack a Website URL.
- (Optional) Give the content pack a description that provides details about what the content pack is about and what kind of information the widgets display.
- (Optional) Give the content pack an icon of size 144 x 144, with a PNG or JPG file type if possible, to help identify your content pack in the marketplace. If using icons that are governed by copyright laws, please ensure you have permission in writing to use the icon before you publish the content pack.
- Select *Export*.

Once complete, a file ending with a VLCP extension, which stands for vRealize Log Insight Content Pack, is downloaded.

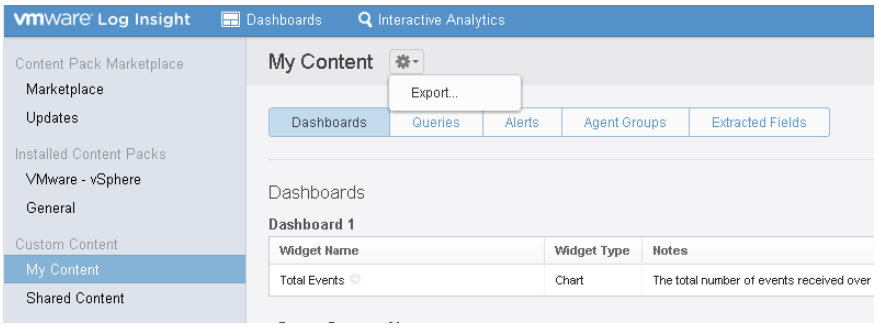


Figure 47. How to export a content pack.

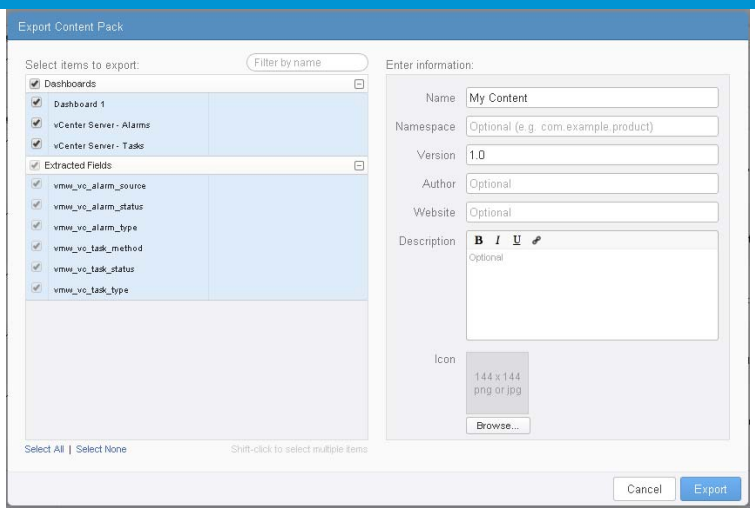


Figure 48. Export content pack dialog box.

Import

To import a content pack:

1. Click the *Import Content Pack* link at the bottom of the left navigation bar.
2. Click *Browse*... to specify the location of the VLCP file.
3. Click *Import*.
   - You can install the imported content pack as an Installed Content Pack, where you can use the content pack but cannot edit the content pack.
   - OR, You can import the content pack into user content (My Content), where you can edit the content pack and queries, alerts and fields in the content pack.

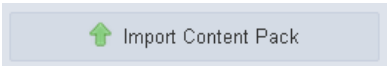


Figure 51. Import button.

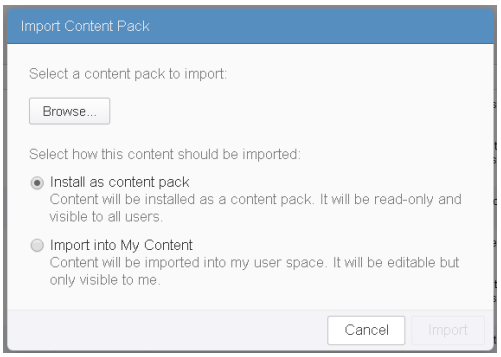


Figure 52. Importing a content pack dialog box.

When importing a content pack, warning/error events can occur. These include:

- Duplicate Name: A Duplicate Name means that another content pack is installed in the system that has the same unique identifier. In this case, the options are to either choose *Overwrite* to replace the existing content pack or *Cancel* to keep the existing content pack.
- Invalid Format: Invalid Format means that the VLCP file was manually edited and contains syntax errors. The syntax errors must be fixed before the content pack can be imported. As VLCP files should not be manually edited, there is no easy way to locate and fix syntax errors.

Figure 53. Duplicate content pack warning dialog box.

Figure 54. Content pack error dialog box.

Edit

As imported content packs that are imported to Installed content packs are read-only, content packs should be edited from the instance of Log Insight on which they were created. It is possible to import content packs into user content, also known as user space, and to modify its contents. Take care that the user space does not contain any widgets, alerts, fields or queries from another content pack or the user will receive mixed content, resulting in confusion. The recommendation is to modify content packs on the instance of Log Insight used to create the original content pack. The original Log Insight instance should be properly backed up.

Publish

After a content pack has been created, it can be published on the Log Insight marketplace, which is located on the VMware Solution Exchange. The requirements for content pack publishing are as follows:

- Content pack: A VLCP file.
- Events: Appropriate events that are necessary to validate content pack.
- Demo/Story: Example of how the content pack brings value (e.g. YouTube video).
- Documentation: Information about how to configure the product/application to forward logs to Log Insight. For more information, see the Resources section below.

Conclusions

Content packs are a powerful way to extend the knowledge contained within Log Insight. When creating a content pack, several best practices must be considered as outlined below.

Getting Started

Instance

- The instance of Log Insight used to create a content pack must be backed up. If the instance used to create a content pack becomes unusable, the content pack must be recreated on a different instance so that it can be modified.
- Do not attempt to edit a content pack from an instance of Log Insight other than the one that created the content pack, unless the intention is to recreate the content pack.

User

- Use a separate content pack author user on Log Insight for each content pack that is created.

Queries

Message Queries

- Use keyword queries whenever possible.
- If keyword queries are not sufficient, use globs.
- Use regular expressions only if keywords and globs are not sufficient. When using regular expressions, provide as many keywords as possible.
- Make queries as specific as possible. Content pack queries should only match events applicable to the product/application for which the content pack was designed.

Field Extraction

- Minimize the number of regular expressions that are used, whenever possible.
- Verify that a regular expression value will match every applicable log message.
- Provide as much pre-keyword and/or post-keyword context as possible.
- When naming a field:
  - Use the following naming standard: <*prefix*>_<*field*>_<*name*>
  - Use underscores, not spaces.
  - Use all lowercase letters.
  - <*prefix*> = something applicable to the content pack.
- Use keywords in additional context of field to help performance of field in queries.
- Use additional context filters on fields if possible to help field performance in queries.
- Test to validate that an extracted field is working as expected.

Aggregation Queries

- When grouping by time series, do not add more than one field.
- Do not group by time series and one field if the number of unique fields is or could be more than 20.
- When grouping by more than one field and time series, ensure that the time series adds value.
- If the time series is important for more than one field, consider creating individual charts per field and per time series, and save charts in the same column of a dashboard group.
- When constructing aggregation queries, ensure that message queries return equivalent results.

Alerts Queries

- Create alerts primarily for critical events.
- Limit alerts using thresholds. In general, a user should not receive more than six alerts per hour.
- Any saved alerts are disabled after they have been exported as part of a content pack. Email and/or vRealize Operations Manager definitions are not be included in a content pack.
- Be sure to enter descriptive information about an alert so a user will understand why it is important.

Dashboards

Dashboard Groups

- Consider starting with an overview dashboard group.
- Create dashboard groups based on a specific type of message (e.g. overview, performance, etc.), not based on a specific type of component (e.g. compute, network, storage).
- It is recommended to duplicate the same dashboard widget in multiple dashboards groups if the dashboard widget is applicable in each dashboard group.
- Target at least three dashboard groups in a content pack.
- Dashboard groups and dashboard widgets cannot be reordered, except with user content.

Dashboard Widgets

- Target at least three dashboard widgets per dashboard group.
- Do not put more than three dashboard widgets in the same row.
- Do not put more than eight dashboard widgets in a dashboard group.
- When displaying similar information in different formats, ensure each format brings value.
- Stack related dashboards together for easier viewing.
- Give the dashboard widgets descriptive names. Do not use field names in widget titles.
- Include notes for every dashboard widget. Ensure that the notes answer questions such as, *"Why is the widget important?"* and *"Where can additional information be found?"*
- Changing the definition of a field does not require that all dashboard widgets created with the previous field definition be re-created to take advantage of the new field definition. Saving the field definition should reflect the change in all occurrences of the field.
- The query definition of a dashboard widget can be modified, using the Edit chart in Interactive Analytics menu.

Content Packs

- A content pack should contain a minimum of three dashboards, nine total widgets, five alerts, and 20 fields.
- When exporting a content pack use the naming format: <*Company*> – <*Product*> v<*Version*>. Ideally, the content pack name should be less than 30 characters to prevent word wrapping.
- When exporting a content pack for publishing, export with a namespace.
- When exporting with a namespace, use the namespace format: <*Ext*>.<*Domain*>.<*Product*>.

Resources

Additional information about Log Insight and Log Insight content packs can be found using the links below.

- VMware vRealize Log Insight documentation:
  http://www.vmware.com/support/pubs/log-insight-pubs.html
- VMware vRealize Log Insight communities:
  http://communities.vmware.com/community/vmtn/vcenter/vcenter-log-insight
- VMware vRealize Log Insight marketplace:
  https://solutionexchange.vmware.com/store/loginsight
- VMware vRealize Log Insight ideas:
  http://loginsight.vmware.com

Acknowledgments

The author wishes to thank the following individuals for their technical review of this white paper: Jon Herlocker, Chris Blinn, and Yogita Patil.

About the Author

Steve Flanders is a Senior Solutions Architect at VMware. He has an extensive background in designing and implementing cloud solutions with focuses on ensuring scalability and promoting a cloud vision. Steve has helped architect a number of cloud offerings including VMware's Cloud Foundry, ATT's Synaptic Storage as a Service, and EMC's Atmos Online. Steve is the author of SFlanders.net, a technology-centric weblog focusing on a variety of topics including cloud computing, virtualization, and system administration.

- Follow Steve's blog at http://sflanders.net
- Follow Steve on Twitter: @smflanders

VMware, Inc. 3401 Hillview Avenue Palo Alto CA 94304 USA Tel 877-486-9273 Fax 650-427-5001 www.vmware.com
 Item No: VMW-TWP-CREATING-CONTENT-PACKS-IN-vCENTER-USLET-104 06/15