SAS® Environment Manager – A SAS® Viya® Administrator's Swiss Army Knife

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ABSTRACT

The latest version of SAS Viya brings with it a wealth of new capabilities, and administrators are by no means left out of the party. The version of SAS® Environment Manager that accompanies SAS Viya 3.3 significantly ratchets up what a SAS® administrator can accomplish with this next generation HTML5-based web application.

See new features of its top-level dashboard, including an at-a-glance widget that provides the health of all SAS Viya machines, services, and service instances in a hierarchical heat map. Witness the new Logged Issues widget highlighting recent errors with details to help diagnose and head off escalating problems.

Learn about all the new SAS Environment Manager menu options, including viewers for:

- Licensed Products – showing expiration dates and grace periods for all deployed products
- Logs – consolidating logging from SAS services with advanced filtering and summarization
- Machines – graphing CPU and memory consumption, and listing specific metric checks and supported services
- Scheduling – monitoring and editing scheduled jobs

Finally, discover additional features like an advanced data explorer for importing data sources, as well as the ability to create and manage user-defined-formats.

In general, gain an appreciation for all the new "blades" SAS has added to its multi-purpose Swiss Army knife for administration. Gain an understanding of advanced features and sharpen your skills in monitoring and managing a SAS Viya 3.3 environment.

INTRODUCTION

Over the years, SAS has been committed to providing a complete and consolidated administrative experience, including robust monitoring and management capabilities for SAS administrators. While SAS Viya offers the next evolution of the SAS platform, SAS® Environment Manager 3.2 offers the next evolution of a web-based application for administering that platform. This single point of administration offers tools that you have grown accustomed to using while managing your users, resources, content, and data, and now offers additional tools to allow visibility across the entire SAS Viya analytical environment. These tools are essential in recognizing and diagnosing real-time resource status and usage, system health, and system activity.

This paper will offer you a high-level overview of each tool, or "blade", available within the new SAS Environment Manager 3.2 application, the multi-purpose Swiss Army knife for administration. Not only will we discuss what each tool offers, but we will explain how it can be used to diagnose and answer questions every administrator is sure to have.

ADMINISTRATION DASHBOARD PORTAL

It is important to recognize how your environment is performing, but it is even more important to be able to recognize *and* understand *quickly* how your environment is performing. SAS Environment Manager for

SAS® 9 offers a wealth of monitoring capabilities that our users have learned to rely on to quickly detect and discern problem areas within their environment. The new SAS Environment Manager for SAS Viya has been completely re-written, and takes advantage of a cleaner HTML5-based user interface that is used by other SAS Viya applications. This change not only allows our interface to be consistent with other SAS products, but it gives us the advantage and ability to use the latest industry components available to provide a robust, dynamic and intuitive interface. We believe you will be impressed not only with the way it looks, but the way it works.

SAS ENVIRONMENT MANAGER DASHBOARD

When you invoke SAS Environment Manager 3.2 running on SAS Viya 3.3, you will notice big differences in our Dashboard. It contains a variety of new dynamic widgets that provide real-time updates to aid SAS administrators in making the most accurate evaluations as quickly as possible. In addition, we have a dedicated area for reports, which is visible by selecting the "Show Reports" option. You will also notice updates to the navigation on the left side of the application, which shows a consolidated view of available tools and, more importantly, provides a more intuitive user flow. Figure 1 shows the new Dashboard and Left Navigation of SAS Environment Manager.
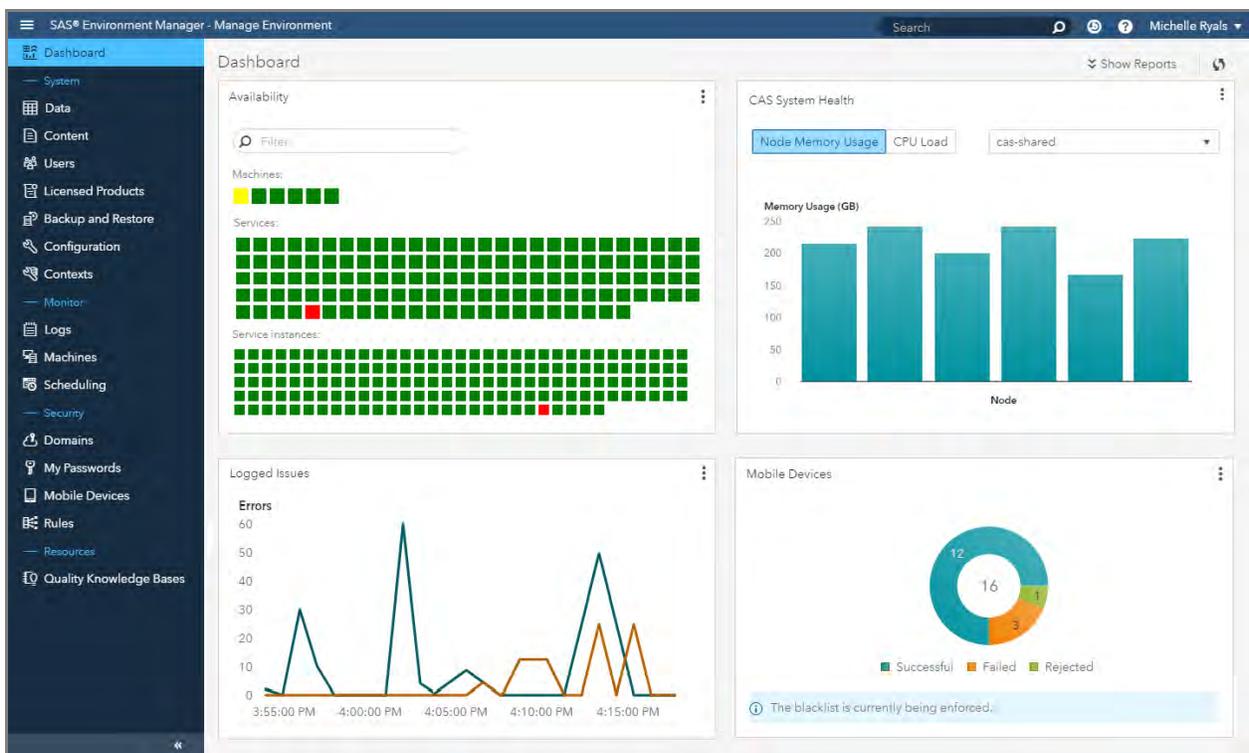
Figure 1. SAS Environment Manager Dashboard

Dashboard Widgets

Availability

The Availability widget offers SAS administrators a real-time view of the status of resources that are defined in your environment. The block sizes in the widget have been designed to range in size in order to differentiate between the three types of resources: machines, services, and instances of services. The status of the resources is represented in a "stop light" fashion. For example, if a service instance fails, its status will change from green to red. If only one service instance exists, then the corresponding service will also turn from green to red, and the status of the associated machine will change from green to yellow (as shown in Figure 1 above). If multiple instances of a service exist, the status will "roll up" to the service and machine levels by changing those from green to yellow. These dynamic changes in status with easy-

to-understand color mapping allow you to make immediate decisions and react accordingly to problem areas within the environment.

In addition to status, you can see details related to services and how they are deployed in the environment. This is accomplished by providing a visual linking between machines, services, and their instances. For example, selecting a service instance in the lowest grouping will highlight the corresponding service and machine where that service is running. Likewise, selecting a machine from the top grouping will provide a list of all services that are running on that machine, as well as a link to detailed information in the new Machines view, which covered in more detail later. Finally, specific information such as service name, machine address, and port number are provided when a service instance is selected. Figure 2 shows an example of service highlighting and properties of a service instance.
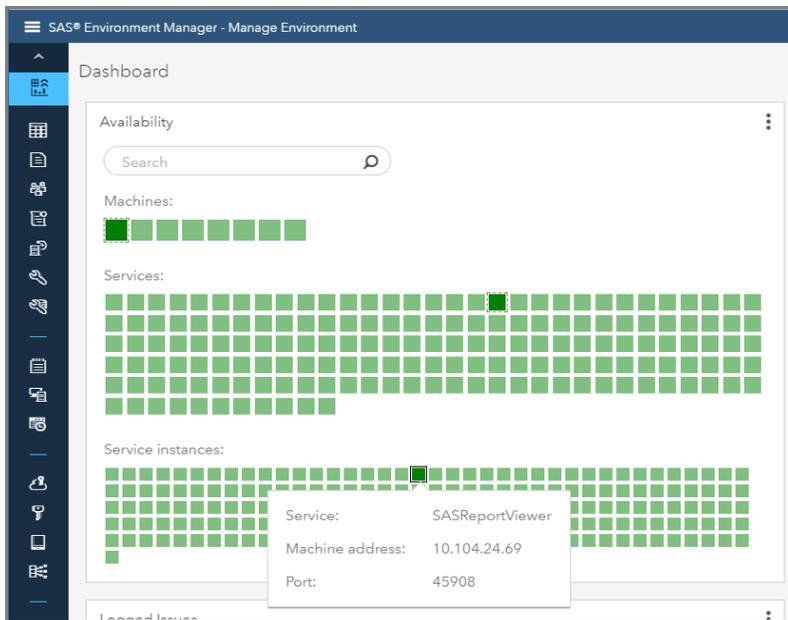
Figure 2. SAS Environment Manager Dashboard – Availability

CAS System Health

The CAS System Health widget provides real-time updates for memory and CPU usage for every SAS® Cloud Analytic Services (CAS) node in a cluster. CAS, the SAS Viya server, performs processing in memory and distributes processing across nodes in a cluster, which makes the at-a-glance CAS System Health widget essential.

Logged Issues

The Logged Issues widget provides administrators a view of errors that might have occurred within the environment, allowing for quick response to potential trouble areas. SAS Environment Manager 3.2 also provides a new consolidated view of all server and service logs within your deployment. This view will be discussed in detail later.

Mobile Devices

The Mobile Devices widget provides administrators with a view of mobile device access attempts, identified as successful, failed, or rejected. The SAS® Mobile BI application provides mobile device users the ability to view and interact with reports. SAS Environment Manager 3.2 provides a blacklist and whitelist feature. This feature gives you the ability to manage whether a specific device can access servers through the SAS Mobile BI application, either by excluding or including the device.

Top 5 Custom Groups

The Top 5 Custom Groups widget is not displayed on the SAS Environment Manager Dashboard by default, but can be surfaced with a simple change in personal settings. SAS Viya gives you the ability to

create custom groups for your specific needs, explained more below in the Users and Groups section. The Top 5 Custom Groups widget displays the five custom groups that contain the most members.

Dashboard Reports

SAS Environment Manager 3.2 offers a variety of out-of-the-box reports that are packed with metric information related to the resources defined in your environment. These additional tools were strategically created to represent key areas in an easy to understand format using SAS® Visual Analytics reports. Figure 3 shows the new reports on the SAS Environment Manager Dashboard.
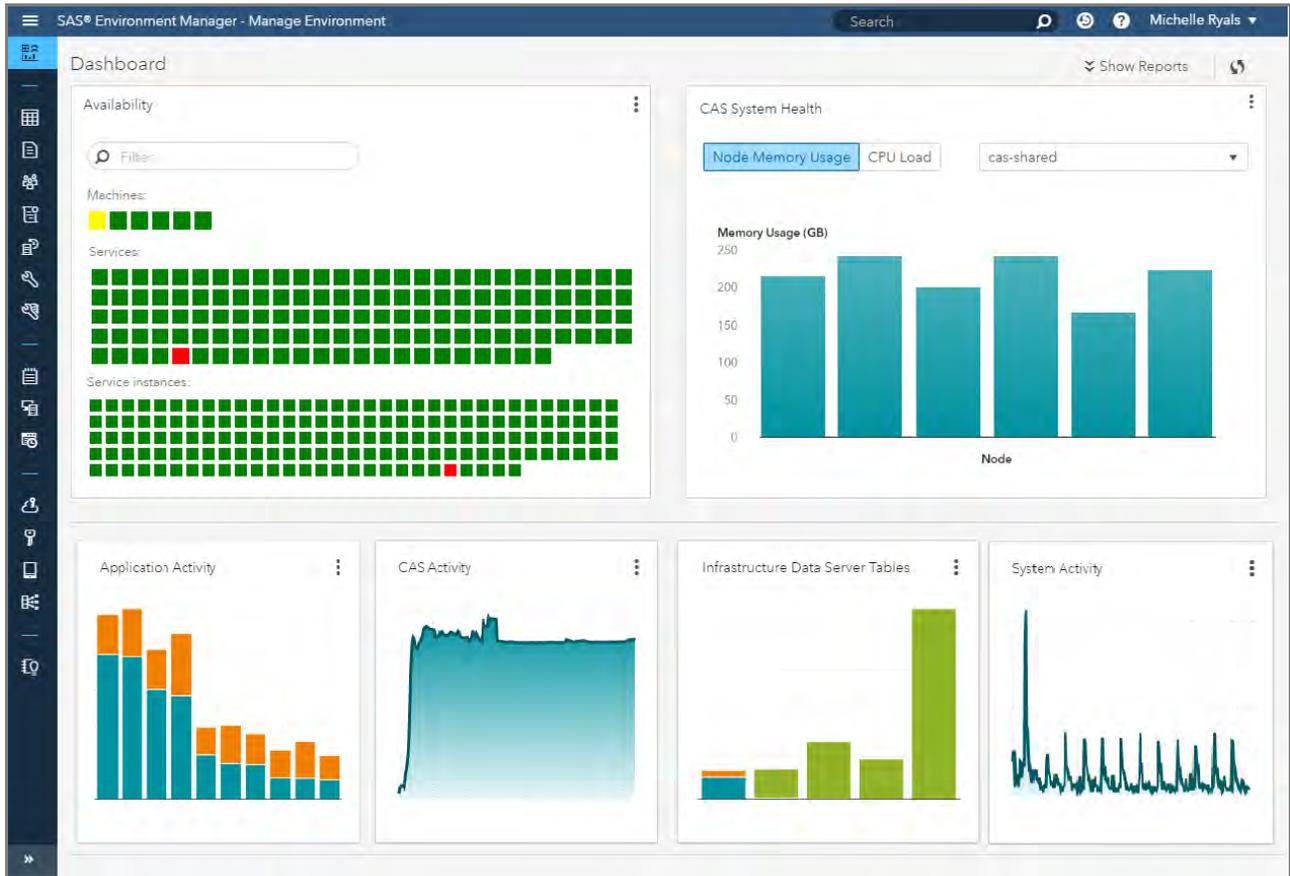
Figure 3. SAS® Environment Manager Dashboard - Reports

The following out-of-the-box reports are available:

- Application Activity – organized by machine, this report offers memory usage by application, system session history, application history, and data collection status.

- CAS Activity – this report displays metrics specific to the CAS server, including CPU load, system I/O wait time, open files, memory statistics, and node cluster details.

- Disk Space – organized by machine, this report offers filesystem metrics representing disk space usage, storage, usage over time, and disk full forecasting.

- Infrastructure Data Server Tables – this report includes metrics related to table sizes, usage trends, application usage of tables, and table size history.

- Message Queue Activity – this report includes metrics related to publish-in and publish-out counts, messaging activity, and system information. This report also provides an animation of activity over time.

- System Activity – this report displays a variety of statistics available for each machine within the

4

environment. Figure 4 shows an example of the System Activity report in a multi-machine environment.

- User Activity – this report lists metrics including most active users, user actions over time, report and data plan object usage, and failed user requests.
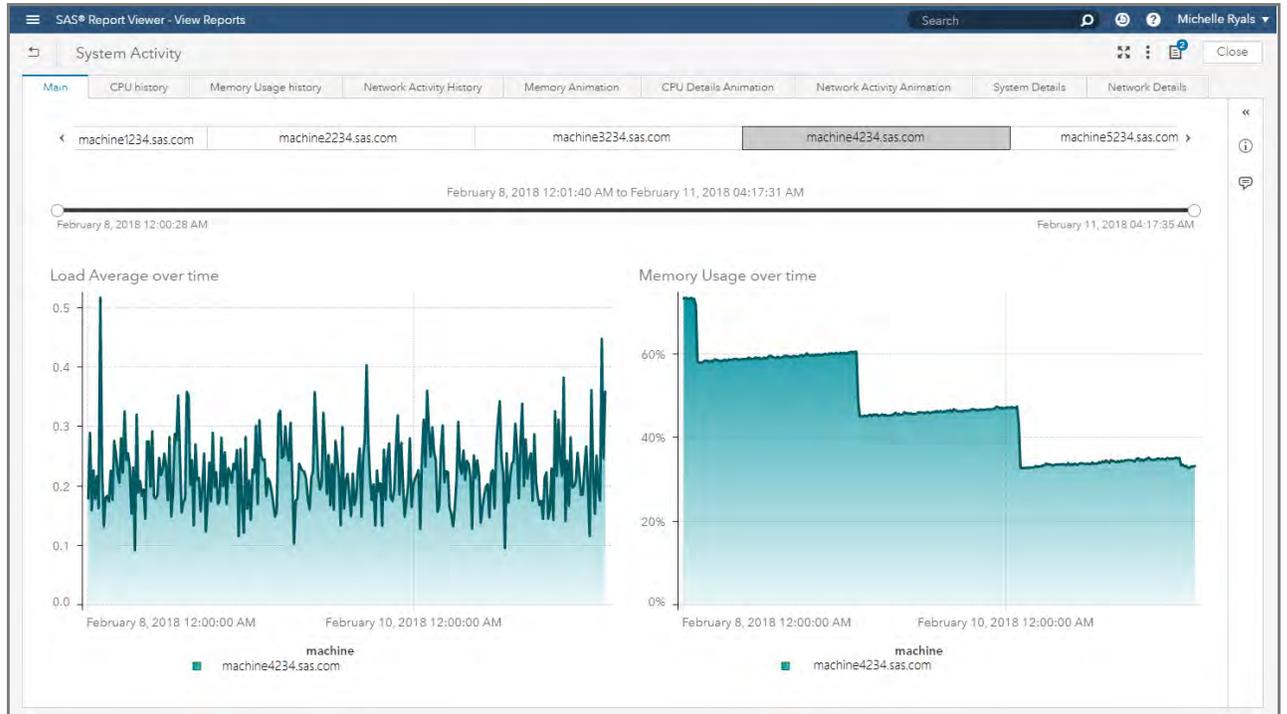
Figure 4. System Activity Report

"Pinning" Reports

Reports provided out of the box are a great start for any administrator wanting to know more about their environment. However, you are not limited to just these reports. Our dashboard now offers a "pinning" capability that allows you to pin a report to your dashboard, using preferences to make the experience specific for each user. The "Pin to dashboard" option is available from any report surfaced in the SAS Environment Manager Content area.

You can personalize the experience by selecting only the reports you would like to view on your dashboard. This is done through Settings, which is available by selecting your user name in the application banner. Settings exist for three areas:

1. Dashboard – the Dashboard widgets, such as Availability and CAS System Health
2. Public Dashboard Items – the out of the box system resource reports
3. My Dashboard Items - reports you have pinned to your dashboard

Figure 5 shows an example of the My Dashboard Items in Settings.
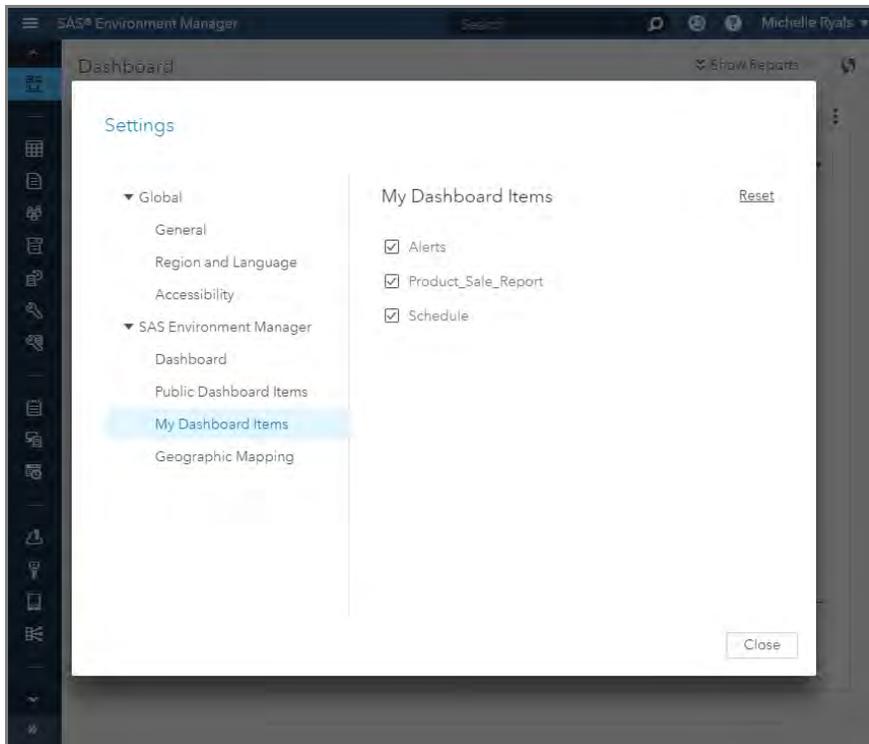
Figure 5. SAS Environment Manager Settings

RESOURCE ADMINISTRATION

AUTHENTICATION

Authentication is the process of verifying an identity. SAS Viya authentication is quite different from the SAS 9 experience. In SAS 9, we use the SAS® Metadata Server to house all users and logins in a dedicated repository. SAS Viya now takes advantage of connecting to a preexisting LDAP directory service or Security Assertion Markup Language (SAML) provider in order to govern logins.

Users and Groups

No longer will you need to duplicate identities from one repository to another as required in SAS 9. Instead, direct Read-Only access is available to all users and groups defined within your corporate directory. However, we do offer the ability to create a custom group that is maintained by SAS Viya and stored in our SAS® Infrastructure Data Server, independent of LDAP. Several custom groups are predefined for your environment during the deployment process, in order to provide access to data, content, and functionality.

- SAS Administrators - Members of this custom group have access to all tasks within SAS Environment Manager, as well as all user content and application functionality. This custom group is defined as an "assumable" group, which means that when a member of this group logs in, they are asked if they want to opt in or "assume" the privileges given to them as a SAS Administrator. Allowing this group to be distinguished as "assumable" means that a user has the option of acting as an administrator or not acting as an administrator, which changes their capabilities in the environment. If a user is not a member of the SAS Administrators group or decides not to assume administrative privileges, they are limited to using only these tools in SAS Environment Manager: Dashboard, Data, Content, Scheduling, and My Passwords.

- Application Administrators - Members of this custom group have the ability to manage application-specific functions. Examples include defining web themes and publishing tiles.

6

- Data Builders - Members of this custom group have access to the SAS® Data Studio product.

- Esri Users - Members of this custom group have access to Esri systems for geo map information.

External Credentials - Domains

Verification of credentials is necessary when you are accessing data from an external source such as a database or third-party product. Domains are used to store the credentials required to access external data sources as well as the identities of those allowed to access these credentials. There are three types of domains: authentication, connection, and encryption.

Authentication domains are defined and associated with a caslib, where the credentials defined match a specific external data source. Connection domains are used for the same purpose as an authentication domain, when access to the external database does not require a password. Finally, encryption domains are used to store encryption keys, which are required to access encrypted data at rest.

Mobile Devices

Earlier we discussed the Mobile Device widget available on the dashboard. The Mobile Devices area offers you the ability to control how a mobile device running the SAS Mobile BI application can access reports and data located on a SAS Visual Analytics server.

AUTHORIZATION

Authorization is essential in defining which resources within your environment are available to which users. SAS Viya authorization is quite different from that of SAS 9, which granted access in different levels through the SAS Metadata Server repository, object level, and fine-grained controls. SAS Viya authorization is a grant-based system, which simply means unless granted, access is implicitly disallowed.

All authenticated users have access to a simplified view of authorization for CAS objects (such as caslibs and CAS tables) and SAS content (such as folders, reports, and plans) for which they have been granted access. Figure 6 shows an example of the Authorization window for a CAS table.

Figure 6. Simplified Authorization Window - CAS Table

Rules

The Rules area provides administrators an advanced, consolidated view of all rules defined within your environment. Rules, defined as a composite of authorization elements, are used to secure SAS content. SAS content includes resources such as folders and reports, but could be expanded to include items such as applications, features and services. Actions that you could use to manage rules directly include create, copy, delete, enable or disable, and modify condition.

SYSTEM ADMINISTRATION

Data

In SAS Environment Manager 3.2, you have a centralized view of data available for interactively managing servers, caslibs, CAS tables, and user-defined formats. Authorization for caslibs and CAS tables can be defined and managed in this area using the simplified authorization window shown above in Figure 6. Figure 7 shows the CAS tables available from the Public caslib in the Data area.

Figure 7. SAS® Environment Manager Data View

User-Defined Formats

The ability to view and manage user-defined formats is new and available in the data area of SAS® Environment Manager 3.2. The application also offers the ability to import existing user-defined formats in the form of an item store. The CAS server provides a procedure that creates an item store from an existing SAS catalog. This item store is simply a physical file that you can then import, which provides access to all existing user-defined formats in SAS Viya.

Content

SAS 9 and SAS Viya use a folder structure to store user content. Each user is given their own user folder, called My Folder, when they initially authenticate and sign in to SAS. After this folder is created for a user, the user has permission to manage this structure for their specific needs. As SAS content is created by using applications such as SAS Visual Analytics, the resulting content objects are stored in a folder structure.

The folders My Favorites and My History are also created based on specific actions. For example, the My Favorites folder is created when a user identifies an item such as a report as a favorite item in the SAS® Home application. The My History folder will track the forty most recent content items a user has accessed while using the system.

Authorization can be defined and managed in this area for content objects by using the simplified authorization window. The window is similar to the authorization window shown above in Figure 6.

Promoting content from one environment to another is an additional feature provided in the Content area. The user interface currently offers the ability to promote folders and reports between SAS Viya environments.

Scheduling

The Scheduling area provides you the ability to manage and schedule jobs that are created as a result of an action performed in other applications such as SAS Data Explorer, SAS Data Studio, or SAS Visual Analytics. Three jobs are provided out of the box:

- Import CAS data from the Public caslib
- Load CAS data to the Public caslib
- Unload CAS data from the Public caslib

As new jobs are created, they will surface in the scheduling view and can be scheduled to run at a time interval of your choosing.

MONITORING

OPERATIONS INFRASTRUCTURE

Great advances have been made in collecting and charting data on metrics for monitored resources in your environment. We are now able to provide a comprehensive view of resource health and operation. The operations infrastructure, which is a grouping of metric data collectors and checkers, Rabbit MQ message exchanges, and data mart and extract, transform, and load (ETL) processes, provides the foundation for all of the metric and log checking capabilities. The reports discussed earlier are made possible with the information gathered from the operations infrastructure. Metrics are made available through an exchange and are stored in CAS tables within the System caslib area. Metric information is constantly updated by pulling from the exchange mechanism, which enables you to use the most up-to-date information possible. Because metrics are stored in CAS tables and are available in the System caslib, you have the opportunity to create a report of your choice with the data available.

Figure 8 shows the operations infrastructure
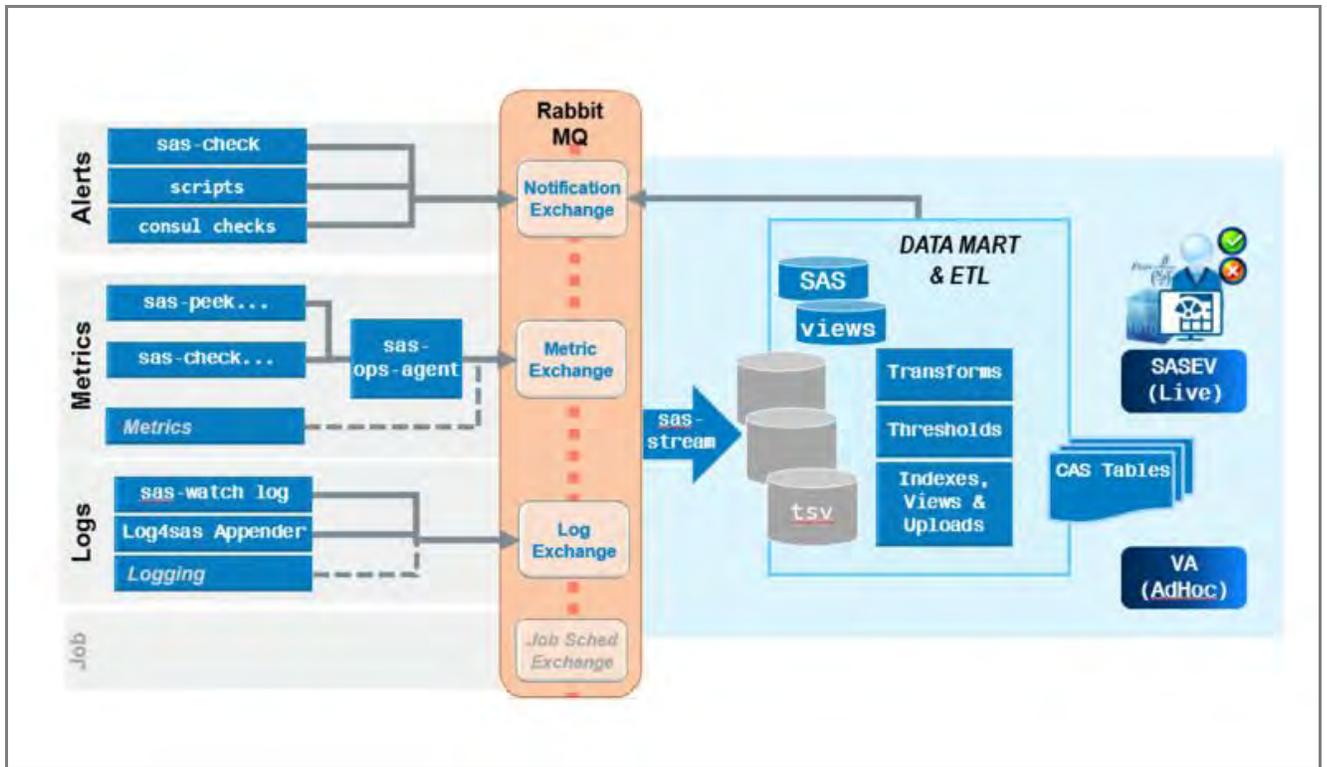
Figure 8. Operations Infrastructure

Machines

SAS Environment Manager 3.2 shows off the latest advances in monitoring and operations in the Machines view by surfacing an abundance of metrics for each resource defined in your environment. Organized by machine, this view offers details for items such as CPU and memory consumption, deployed service instances, the status of individual service instances, machine checks, machine properties, system metrics, system limits, and deployed SAS package information.

Figure 9 shows the Machines view in SAS Environment Manager
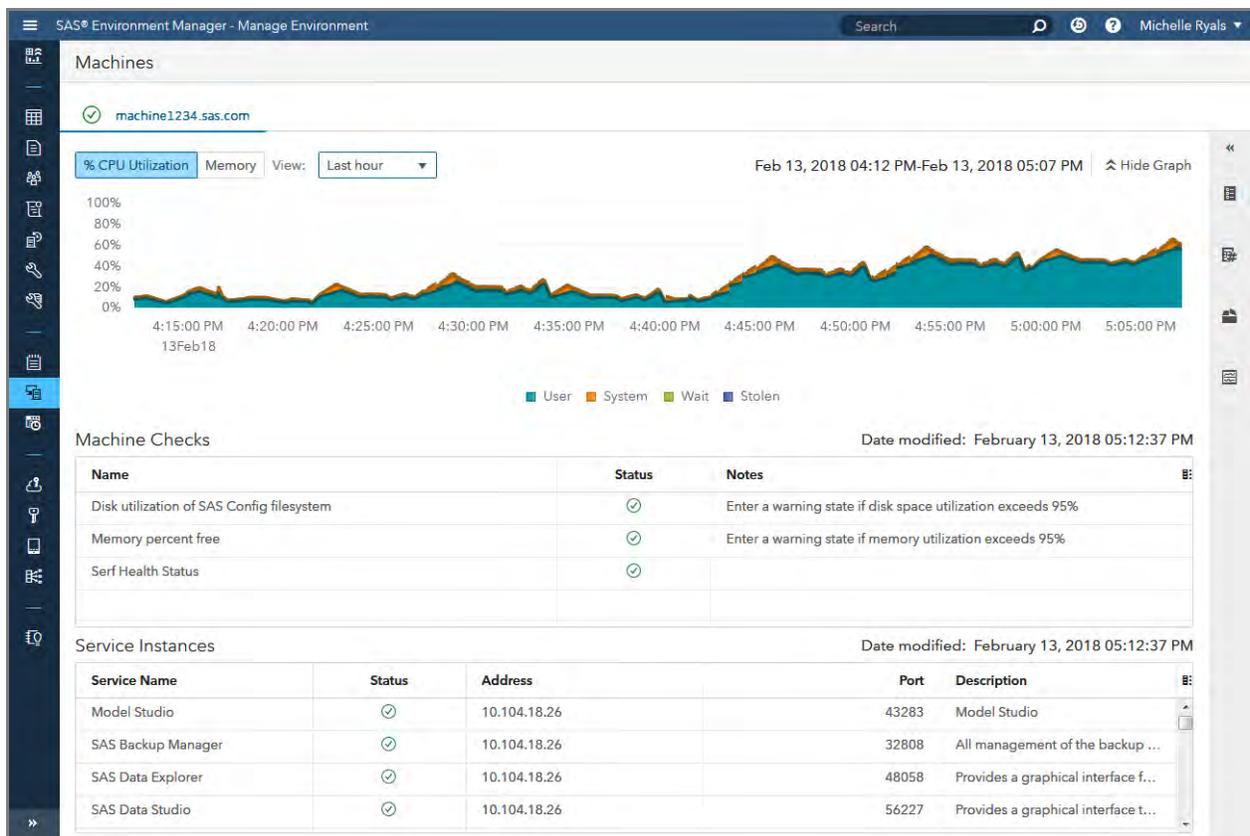
Figure 9. SAS Environment Manager Machines View

Logs

All servers and services deployed in SAS Viya will produce log files, which means that there are many log files to comb through when attempting to research and understand a problem area or issue. Until now, we have not offered a way for you to view log files from a user interface. Rather, you have had to access log files directly, one at a time, from multiple deployment locations, which is a very time consuming process, to say the least. The Logs view offers a long-awaited consolidated list of log files from across the environment in one centralized location. With added search capabilities and subsetting of information based on logging level, source, and time, this tool is sure to aid you in researching and diagnosing issues faster than ever before.

In addition, the new Configuration area discussed below allows logging levels to be altered, which enables you to control the level of output to be analyzed. This means you have the option of changing your logging level to a more granular level when it is necessary for diagnosing issues, and then changing it back to reduce output. When logging levels are altered, they take effect almost instantly, which allows for a quick response time when you are attempting to resolve an issue.

Figure 10 shows the Logs view in SAS Environment Manager
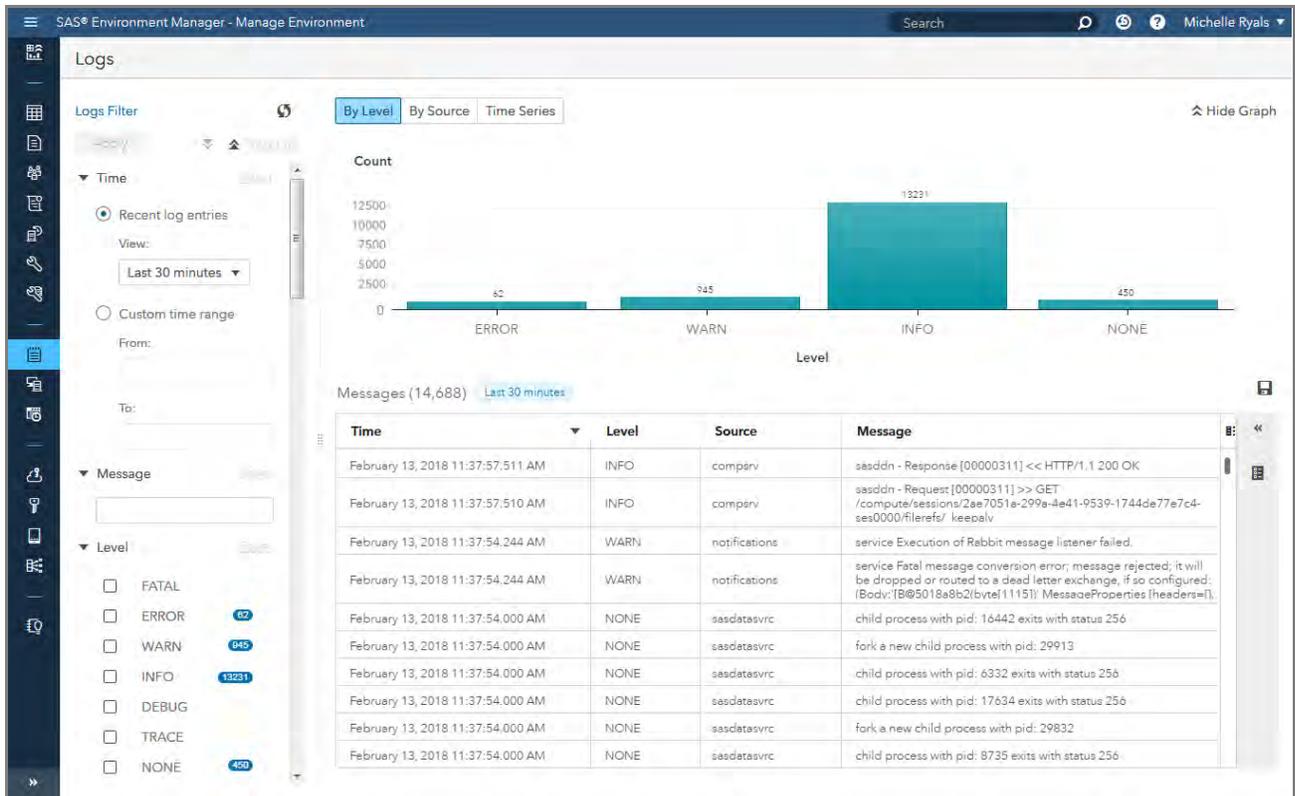
Figure 10. SAS Environment Manager Logs View

DEPLOYMENT ADMINISTRATION

MANAGING YOUR DEPLOYMENT

Configuration

While the majority of configuration for your environment's resources is taken care of for you during deployment of SAS software, there are times when you will need to modify these settings. The Configuration view provides this capability, with modifications taking effect almost instantly. Examples where modifications are likely include LDAP settings, memory allocation, time-out values, logging levels, and the Esri map service location. Figure 11 shows the Configuration view in SAS Environment Manager.
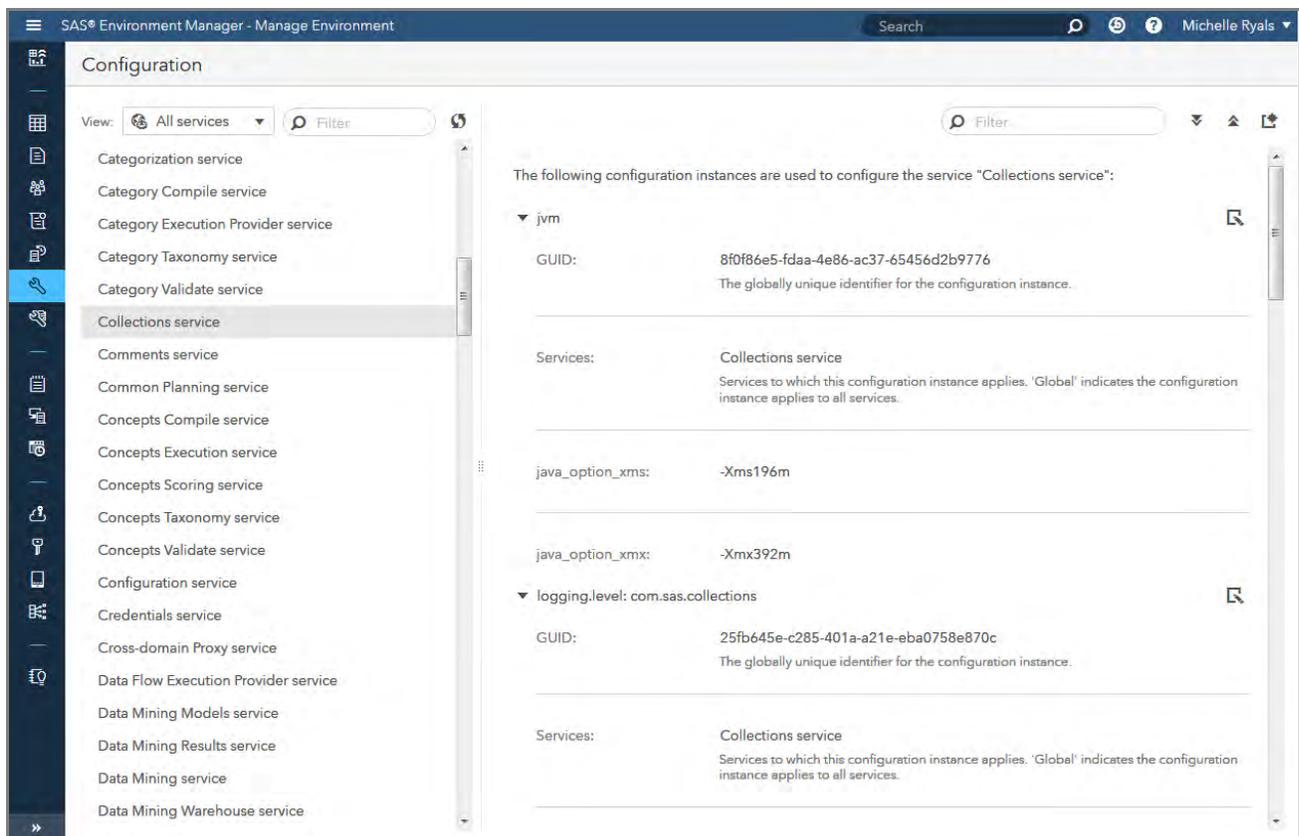
Figure 11. SAS Environment Manager Configuration View

Licensed Products

SAS Viya uses a single licensing file used by both CAS and SAS® Foundation. The license is applied during installation to the CAS in-memory compute engine and the SAS Foundation compute engine. New licenses can be applied to enable new products or to extend a license that might be expiring soon. Once again, we surface this information in a concise and organized view within SAS Environment Manager to enable you to view all product licenses and to understand the current status of those licenses. A license status can be one of the following:

- Current
- Due for renewal (grace period)
- About to expire (warning period)
- Expired

Backup and Restore

The ability to back up and restore an environment was available in SAS 9 and is also available in SAS Viya. Specific configurations are necessary to tell SAS where you would like your backup to reside. When a backup is created, the associated files are stored locally on the machine where your data resides. These backup files are then automatically transferred to the central backup vault. If there are any aspects of the backup that are not successful, the entire backup is considered a failure and will need to be performed again in order to guarantee success.

CONCLUSION

SAS administration is a huge responsibility for any organization. Couple that responsibility with the fact that you as an administrator are now expected to understand SAS Viya, as well as the latest enhancement of the SAS 9 platform, and the tasks involved could seem daunting. Our administration roadmap is strong and continues to emphasize the goal of making you as a SAS administrator as successful as possible in managing your environment, recognizing potential problem areas, and resolving those problems as quickly and accurately as possible. The additional functionality provided in SAS Environment Manager 3.2 delivers on all accounts, and offers consolidated views never provided before in the Licensed Products, Logs and Machines views. SAS has already delivered a unified view into your environment for administration across all SAS products, but we continue to incorporate feedback from SAS administrators as we strive to constantly improve our product and your user experience.

REFERENCES

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