Network Equipment Data in Serverless Architecture

Carmen Sacristan, Pradnya Mahurkar, Tyler Bouwens
Meet the Team

Maria del Carmen Sacristan Benjet
Senior
Computer Science

Pradnya Mahurkar
Senior
Computer Science

Tyler Bouwens
Senior
Computer Science
JUNIPER PROGRAMMATIC AWS DASHBOARD DEPLOY

Creating root template that creates and references the sub stacks

Creating substack-template files until all dashboards are in a template. Each template file having the number of dashboards per template established by param DASH_PER_FILE.

Loop = (NFXSN + 1)/DASH_PER_FILE
Introductions to Dashboards

- Devices at client locations send logs to the JSAS' AWS CloudWatch
Introductions to Dashboards

- Devices at client locations send logs to the JSAS' AWS CloudWatch
- Logs help keep track of device status and enable troubleshooting
Introductions to Dashboards

- Devices at client locations send logs to the JSAS' AWS CloudWatch

- Logs help keep track of device status and enable troubleshooting

- A huge volume of logs is imported on a daily basis
Introductions to Dashboards

- Devices at client locations send logs to the JSAS' AWS CloudWatch
- Logs help keep track of device status and enable troubleshooting
- A huge volume of logs is imported on a daily basis
- Dashboards are made up of widgets
Assessing Need

Over the years...

20+

Client Devices

The Beta version of the JSAS has been deployed at an increasing number of client sites
Assessing Need
Over the years...

Client Devices
The Beta version of the JSAS has been deployed at an increasing number of client sites

Log Messages
Thousands of log messages are received every day by the AWS CloudWatch Console
Develop scalable, filtered, and organized dashboards to facilitate faster debugging and provide an enhanced user experience with increased readability of logs.
Dashboard Creation Using AWS CloudFormation
Learned the technologies
Assessed and analyzed problems in the current state of the dashboard
Provided documentation
Developed solutions

Methodology
JSAS Dashboard Solution Approaches

01

Naïve Stack Approach
Naïve Stack Approach

Design

- IaC iteratively builds templates and stacks for each filtered dashboard
### Naïve Stack Approach

**Benefits**

- Separate filtered dashboards
- Increased readability of log data
- Programmatic creation
### Naïve Stack Approach

**Drawbacks**

- Abundant memory required
- Individual deployment, update and deletion
- Time consuming build
JSAS Dashboard Solution

Approaches

01 Brute Force Approach

02 Singular Stack Solution
Singular Stack Solution

Benefit

- Time efficient
- Doesn’t clutter stack storage
Singular Stack Solution

Benefit
- Time efficient
- Doesn’t clutter stack storage

Design
- IaC tool generates templates and deploys them all in one stack
- Utilizes S3 to avoid CLI size limits
Singular Stack Solution

**Benefit**
- Time efficient
- Doesn’t clutter stack storage

**Design**
- IaC tool generates templates and deploys them all in one stack
- Utilizes S3 to avoid CLI size limits

**Drawbacks**
- New file size limit concerns
- Process lacks automation at points
JSAS Dashboard Solution Approaches

01 Brute Force Approach

02 Singular Stack Solution

03 Nested Stack Approach
Nested Stack Solution

Benefit

- Prevents file size limit issues
- Complete automation
Nested Stack Solution

**Benefit**
- Prevents file size limit issues
- Complete automation

**Design**
- IaC tool handles template creation utilizing nested stack logic
- S3 Buckets store templates to bypass file size limits
JSAS Dashboard Solution Approaches

01. Brute Force Approach
02. Singular Stack Solution
03. Nested Stack Approach
04. Organizing Dashboard Data
Everything in One Place Widget

Organized Logs

The widget displays the completed events first followed by in-progress events.
Everything in One Place Widget

Organized Logs
The widget displays the completed events first followed by in-progress events

Centralized Widget
Joins multiple log streams to display multiple statistics in one log table
### Everything in One Place Widget

#### Organized Logs
The widget displays the completed events first followed by in-progress events.

#### Centralized Widget
Joins multiple log streams to display multiple statistics in one log table.

#### Highlight Inconsistencies
The unaccounted columns display any unusual or inconsistent behaviors.

<table>
<thead>
<tr>
<th>startTime</th>
<th>endTime</th>
<th>time_scheduled</th>
<th>last_response_or_s3_url</th>
<th>time_elapsed_sec_f</th>
<th>s3uploadid_all</th>
<th>expectedUnaccountedID</th>
<th>actualUnaccountedID</th>
<th>s3_uploads</th>
<th>success_count</th>
<th>failure_count</th>
<th>unaccounted_process_response</th>
<th>unaccounted_s3_upload</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021-11-30T00:20:16.333</td>
<td>2021-11-30T00:20:17.472</td>
<td>2021-11-30T00:00:46.2932</td>
<td>2021-11-30T00:20:17.472</td>
<td>8.0</td>
<td>19.0</td>
<td>31.237</td>
<td>79899350-bcc=1616-956e=781</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2021-11-30T00:16:54.768</td>
<td>2021-11-30T00:16:54.768</td>
<td>2021-11-30T00:00:46.2932</td>
<td>2021-11-30T00:16:54.768</td>
<td>8.0</td>
<td>16.0</td>
<td>8.557</td>
<td>79899350-bcc=1616-956e=781</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2021-11-30T00:16:44.484</td>
<td>2021-11-30T00:16:44.484</td>
<td>2021-11-30T00:00:46.2932</td>
<td>2021-11-30T00:16:44.484</td>
<td>8.0</td>
<td>15.0</td>
<td>56.64</td>
<td>79899350-bcc=1616-956e=781</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2021-11-30T00:12.53.678</td>
<td>2021-11-30T00:12.53.678</td>
<td>2021-11-30T00:00:46.2932</td>
<td>2021-11-30T00:12.53.678</td>
<td>8.0</td>
<td>12.0</td>
<td>7.429</td>
<td>79899350-bcc=1616-956e=781</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2021-11-30T00:11.42.481</td>
<td>2021-11-30T00:11.42.481</td>
<td>2021-11-30T00:00:46.2932</td>
<td>2021-11-30T00:11.42.481</td>
<td>8.0</td>
<td>10.0</td>
<td>77.72</td>
<td>79899350-bcc=1616-956e=781</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2021-11-30T00:09.23.289</td>
<td>2021-11-30T00:09.23.289</td>
<td>2021-11-30T00:00:46.2932</td>
<td>2021-11-30T00:09.23.289</td>
<td>8.0</td>
<td>9.0</td>
<td>8.04</td>
<td>79899350-bcc=1616-956e=781</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2021-11-30T00:08.44.231</td>
<td>2021-11-30T00:08.44.231</td>
<td>2021-11-30T00:00:46.2932</td>
<td>2021-11-30T00:08.44.231</td>
<td>8.0</td>
<td>8.0</td>
<td>13.265</td>
<td>79899350-bcc=1616-956e=781</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2021-11-30T00:06.15.624</td>
<td>2021-11-30T00:06.15.624</td>
<td>2021-11-30T00:00:46.2932</td>
<td>2021-11-30T00:06.15.624</td>
<td>8.0</td>
<td>5.0</td>
<td>54.874</td>
<td>79899350-bcc=1616-956e=781</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2021-11-30T00:05.53.325</td>
<td>2021-11-30T00:05.53.325</td>
<td>2021-11-30T00:00:46.2932</td>
<td>2021-11-30T00:05.53.325</td>
<td>8.0</td>
<td>5.0</td>
<td>4.747</td>
<td>79899350-bcc=1616-956e=781</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2021-11-30T00:05.29.371</td>
<td>2021-11-30T00:05.29.371</td>
<td>2021-11-30T00:00:46.2932</td>
<td>2021-11-30T00:05.29.371</td>
<td>8.0</td>
<td>4.0</td>
<td>43.313</td>
<td>79899350-bcc=1616-956e=781</td>
<td>18</td>
<td>16</td>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Future Work

1. Data visualization and insights
Future Work

1. Data visualization and insights
2. Improving the user experience of the AWS Dashboards
Future Work

1. Data visualization and insights

2. Improving the user experience of the AWS Dashboards

3. Adding filters for log tables in AWS Dashboards
Conclusion

These are our results from this term of work

Filtered Dashboards

Dashboards with content filtered to specific serial numbers, to ensure ease of viewing specified log data
Conclusion

These are our results from this term of work

Filtered Dashboards
Dashboards with content filtered to specific serial numbers, to ensure ease of viewing specified log data

JSAS Dashboard Creation IaC Tool
A robust, scaled, and tested tool to create, package, and deploy nested stacks containing filtered dashboards
Conclusion

These are our results from this term of work

Filtered Dashboards
Dashboards with content filtered to specific serial numbers, to ensure ease of viewing specified log data

JSAS Dashboard Creation IaC Tool
A robust, scaled, and tested tool to create, package, and deploy nested stacks containing filtered dashboards

Everything in One Place Widget
A dashboard widget which displays a plethora of relevant and important data, enabling quicker access to vital info
Acknowledgements

MARK CLAYPOOL
Advisor

JOHN SADLIER
Mentor

JAMES AUSTIN
Mentor

NIKHIL JUKAR
Mentor
Thank you, it's been a pleasure!

Any Questions?

Carmen Sacristan, Pradnya Mahurkar, Tyler Bouwens