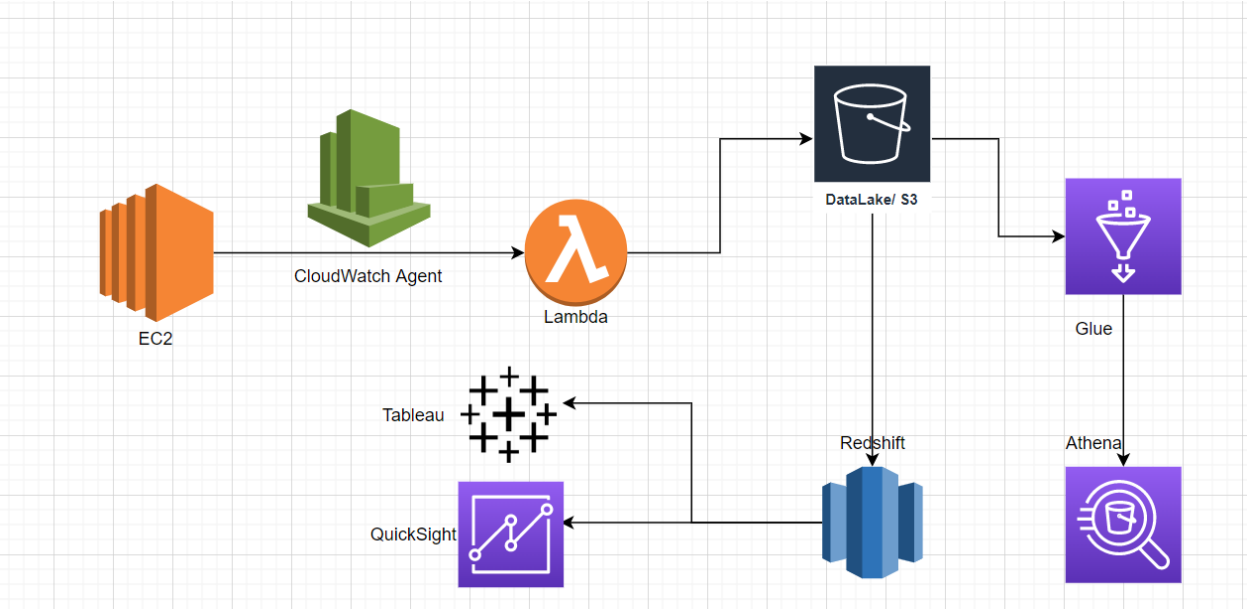
How to capture logs; store them in a data lake, and data warehouse; analyze; and publish reports, dashboards.

A complete end to end solution and a step-by-step implementation process

Enterprise Log Management Architecture



Steps to implement the solution:

1. Create the appropriate IAM role
2. Launch an EC2 instance (the server)
3. Install the httpd
4. Start httpd
5. Access two types of logs – access logs & error logs
6. Get the amazon-cloudwatch-agent.rpm
7. Run the agent wizard to install the cloudwatch agent on each server
8. Once complete verify the CloudWatch log groups
9. Create a Lambda function to copy the data into data lake/ S3
10. Use EventBridge to schedule to copy data into data lake/ S3
11. Using Athena & Glue create the DB and tables to query/ analyze the log data
12. Copy data into Redshift from S3
13. Create reports/ dashboards using AWS QuickSight or Tableau out of Redshift

Create an IAM Role

mm-cloudwatchagent-role with CloudWatchAgentServerPolicy; CloudWatchAgentAdminPolicy

Install and start the httpd

$ **sudo yum install httpd**

[ec2-user@ip-10-0-45-76 html]$ ls -ltr

total 4

-rwxrwxrwx 1 root root 31 May 17 19:47 index.html

[ec2-user@ip-10-0-45-76 html]$ pwd

/var/www/html

[ec2-user@ip-10-0-45-76 html]$

[ec2-user@ip-10-0-45-76 html]$ **sudo systemctl start httpd**

Accessing the log files from /var/log/httpd/

[ec2-user@ip-10-0-45-76 log]$ sudo cat /var/log/httpd/access_log

73.192.163.126 - - [17/May/2022:19:52:14 +0000] "GET / HTTP/1.1" 200 31 "-" "Mozilla/5.0 (Windows NT 10.0; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/101.0.4951.54 Safari/537.36"

73.192.163.126 - - [17/May/2022:19:52:15 +0000] "GET /favicon.ico HTTP/1.1" 404 196 "http://ec2-54-75-110-66.eu-west-1.compute.amazonaws.com/" "Mozilla/5.0 (Windows NT 10.0; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/101.0.4951.54 Safari/537.36"

[ec2-user@ip-10-0-45-76 log]$ sudo cat /var/log/httpd/error_log

[Tue May 17 19:51:48.684227 2022] [suexec:notice] [pid 3500] AH01232: suEXEC mechanism enabled (wrapper: /usr/sbin/suexec)

[Tue May 17 19:51:48.699295 2022] [lbmethod_heartbeat:notice] [pid 3500] AH02282: No slotmem from mod_heartmonitor

[Tue May 17 19:51:48.699335 2022] [http2:warn] [pid 3500] AH10034: The mpm module (prefork.c) is not supported by mod_http2. The mpm determines how things are processed in your server. HTTP/2 has more demands in this regard and the currently selected mpm will just not do. This is an advisory warning. Your server will continue to work, but the HTTP/2 protocol will be inactive.

[Tue May 17 19:51:48.702387 2022] [mpm_prefork:notice] [pid 3500] AH00163: Apache/2.4.53 () configured -- resuming normal operations

[Tue May 17 19:51:48.702412 2022] [core:notice] [pid 3500] AH00094: Command line: '/usr/sbin/httpd -D FOREGROUND'

#!/bin/bash

#Install the agent

wget https://s3.amazonaws.com/amazoncloudwatch-agent/amazon_linux/amd64/latest/amazon-cloudwatch-agent.rpm

[ec2-user@ip-10-0-45-76 ~]$ wget https://s3.amazonaws.com/amazoncloudwatch-agent/amazon_linux/amd64/latest/amazon-cloudwatch-agent.rpm

--2022-05-17 21:32:22-- https://s3.amazonaws.com/amazoncloudwatch-agent/amazon_linux/amd64/latest/amazon-cloudwatch-agent.rpm

Resolving s3.amazonaws.com (s3.amazonaws.com)... 52.217.229.128

Connecting to s3.amazonaws.com (s3.amazonaws.com)|52.217.229.128|:443... Connected.

HTTP request sent, awaiting response... 200 OK

Length: 46945036 (45M) [application/octet-stream]

Saving to: 'amazon-cloudwatch-agent.rpm'

100%[==========>] 46,945,036 19.3MB/s in 2.3s

2022-05-17 21:32:24 (19.3 MB/s) - 'amazon-cloudwatch-agent.rpm' saved [46945036/46945036]

[ec2-user@ip-10-0-45-76 ~]$

Install the package. If you downloaded an RPM package on a Linux server, change to the directory containing the package and enter the following:

sudo rpm -U ./amazon-cloudwatch-agent.rpm

[ec2-user@ip-10-0-45-76 ~]$ sudo rpm -U ./amazon-cloudwatch-agent.rpm

create group cwagent, result: 0

create user cwagent, result: 0

create group aoc, result: 0

create user aoc, result: 0

[ec2-user@ip-10-0-45-76 ~]$

 # Run the wizard
sudo /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent-config-wizard

[ec2-user@ip-10-0-45-76 bin]$ sudo /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent-config-wizard

==

= Welcome to the Amazon CloudWatch Agent Configuration Manager =

= =

= CloudWatch Agent allows you to collect metrics and logs from =

= your host and send them to CloudWatch. Additional CloudWatch =

= charges may apply. =

==

On which OS are you planning to use the agent?

1. linux

2. windows

3. darwin

default choice: [1]:

1

Trying to fetch the default region based on ec2 metadata...

Are you using EC2 or On-Premises hosts?

1. EC2

2. On-Premises

default choice: [1]:

1

Which user are you planning to run the agent?

1. root

2. cwagent

3. others

default choice: [1]:

1

Do you want to turn on StatsD daemon?

1. yes

2. no

default choice: [1]:

1

Which port do you want StatsD daemon to listen to?

default choice: [8125]

What is the collect interval for StatsD daemon?

1. 10s

2. 30s

3. 60s

default choice: [1]:

3

What is the aggregation interval for metrics collected by StatsD daemon?

1. Do not aggregate

2. 10s

3. 30s

4. 60s

default choice: [4]:

4

Do you want to monitor metrics from CollectD? WARNING: CollectD must be installed or the Agent will fail to start

1. yes

2. no

default choice: [1]:

1

Do you want to monitor any host metrics? e.g. CPU, memory, etc.

1. yes

2. no

default choice: [1]:

1

Do you want to monitor cpu metrics per core?

1. yes

2. no

default choice: [1]:

1

Do you want to add ec2 dimensions (ImageId, InstanceId, InstanceType, AutoScalingGroupName) into all of your metrics if the info is available?

1. yes

2. no

default choice: [1]:

1

Do you want to aggregate ec2 dimensions (InstanceId)?

1. yes

2. no

default choice: [1]:

Are you satisfied with the above config? Note: it can be manually customized after the wizard completes to add additional items.

1. yes

2. no

default choice: [1]:

1

Do you have any existing CloudWatch Log Agent (http://docs.aws.amazon.com/AmazonCloudWatch/latest/logs/AgentReference.html) configuration file to import for migration?

1. yes

2. no

default choice: [2]:

2

Do you want to monitor any log files?

1. yes

2. no

default choice: [1]:

1

Log file path:

/var/log/httpd/access_log

Log group name:

default choice: [access_log]

Log stream name:

default choice: [{instance_id}]

Log Group Retention in days

1. -1
2. 1
3. 3
4. 5
5. 7
6. 14
7. 30
8. 60
9. 90
10. 120
11. 150
12. 180
13. 365
14. 400
15. 545

16. 731

17. 1827

18. 3653

default choice: [1]:

Do you want to specify any additional log files to monitor?

1. yes

2. no

default choice: [1]:

/var/log/httpd/error_log

The value /var/log/httpd/error_log is not valid to this question.

Please retry to answer:

Do you want to specify any additional log files to monitor?

1. yes

2. no

default choice: [1]:

1

Log file path:

/var/log/httpd/error_log

Log group name:

default choice: [error_log]

Log stream name:

default choice: [{instance_id}]

Log Group Retention in days

1. -1
2. 1
3. 3
4. 5
5. 7
6. 14
7. 30
8. 60
9. 90
10. 120
11. 150
12. 180
13. 365
14. 400

15. 545

16. 731

17. 1827

18. 3653

default choice: [1]:

Do you want to specify any additional log files to monitor?

1. yes

2. no

default choice: [1]:

2

Saved config file to /opt/aws/amazon-cloudwatch-agent/bin/config.json successfully.

Current config as follows:


```
{
	"agent": {
		"metrics_collection_interval": 60,
		"run_as_user": "root"
	},
	"logs": {
		"logs_collected": {
```

```
            "files": {
                "collect_list": [
                    {
                        "file_path": "/var/log/httpd/access_log",
                        "log_group_name": "access_log",
                        "log_stream_name": "{instance_id}",
                        "retention_in_days": -1
                    },
                    {
                        "file_path": "/var/log/httpd/error_log",
                        "log_group_name": "error_log",
                        "log_stream_name": "{instance_id}",
                        "retention_in_days": -1
                    }
                ]
            }
        }
    },
    "metrics": {
        "aggregation_dimensions": [
```

```
        [
            "InstanceId"
        ]
    ],
    "append_dimensions": {
        "AutoScalingGroupName": "${aws:AutoScalingGroupName}",
        "ImageId": "${aws:ImageId}",
        "InstanceId": "${aws:InstanceId}",
        "InstanceType": "${aws:InstanceType}"
    },
    "metrics_collected": {
        "collectd": {
            "metrics_aggregation_interval": 60
        },
        "disk": {
            "measurement": [
                "used_percent"
            ],
            "metrics_collection_interval": 60,
            "resources": [
```

```
                "*"
            ]
        },
        "mem": {
            "measurement": [
                "mem_used_percent"
            ],
            "metrics_collection_interval": 60
        },
        "statsd": {
            "metrics_aggregation_interval": 60,
            "metrics_collection_interval": 60,
            "service_address": ":8125"
        }
    }
}
```


Please check the above content of the config.

The config file is also located at /opt/aws/amazon-cloudwatch-agent/bin/config.json.

Edit it manually if needed.

Do you want to store the config in the SSM parameter store?

1. yes

2. no

default choice: [1]:

sudo /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent-ctl -a fetch-config -m ec2 -c ssm:configuration-parameter-store-name –s

sudo /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent-ctl -a fetch-config -m ec2 -c ssm:AmazonCloudWatch-linux –s

OR

sudo /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent-ctl -a fetch-config -m ec2 -c file:configuration-file-path -s

Create the types.db file

[ec2-user@ip-10-0-45-76 share]$ sudo mkdir -p /usr/share/collectd

[ec2-user@ip-10-0-45-76 share]$ sudo touch /usr/share/collectd/types.db

[ec2-user@ip-10-0-45-76 bin]$ sudo /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent-ctl -a fetch-config -m ec2 -c file:/opt/aws/amazon-cloudwatch-agent/bin/config.json -s

****** processing amazon-cloudwatch-agent ******

/opt/aws/amazon-cloudwatch-agent/bin/config-downloader --output-dir /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.d --download-source file:/opt/aws/amazon-cloudwatch-agent/bin/config.json --mode ec2 --config /opt/aws/amazon-cloudwatch-agent/etc/common-config.toml --multi-config default

2022/05/17 22:50:11 D! [EC2] Found active network interface

Successfully fetched the config and saved in /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.d/file_config.json.tmp

Start configuration validation...

/opt/aws/amazon-cloudwatch-agent/bin/config-translator --input /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.json --input-dir /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.d --output /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.toml --mode ec2 --config /opt/aws/amazon-cloudwatch-agent/etc/common-config.toml --multi-config default

2022/05/17 22:50:11 Reading json config file path: /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.d/file_config.json.tmp ...

2022/05/17 22:50:11 I! Valid Json input schema.

I! Detecting run_as_user...

2022/05/17 22:50:11 D! [EC2] Found active network interface

No csm configuration found.

Configuration validation first phase succeeded

/opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent -schematest -config /opt/aws/amazon-cloudwatch-agent/etc/amazon-cloudwatch-agent.toml

Configuration validation second phase succeeded

Configuration validation succeeded

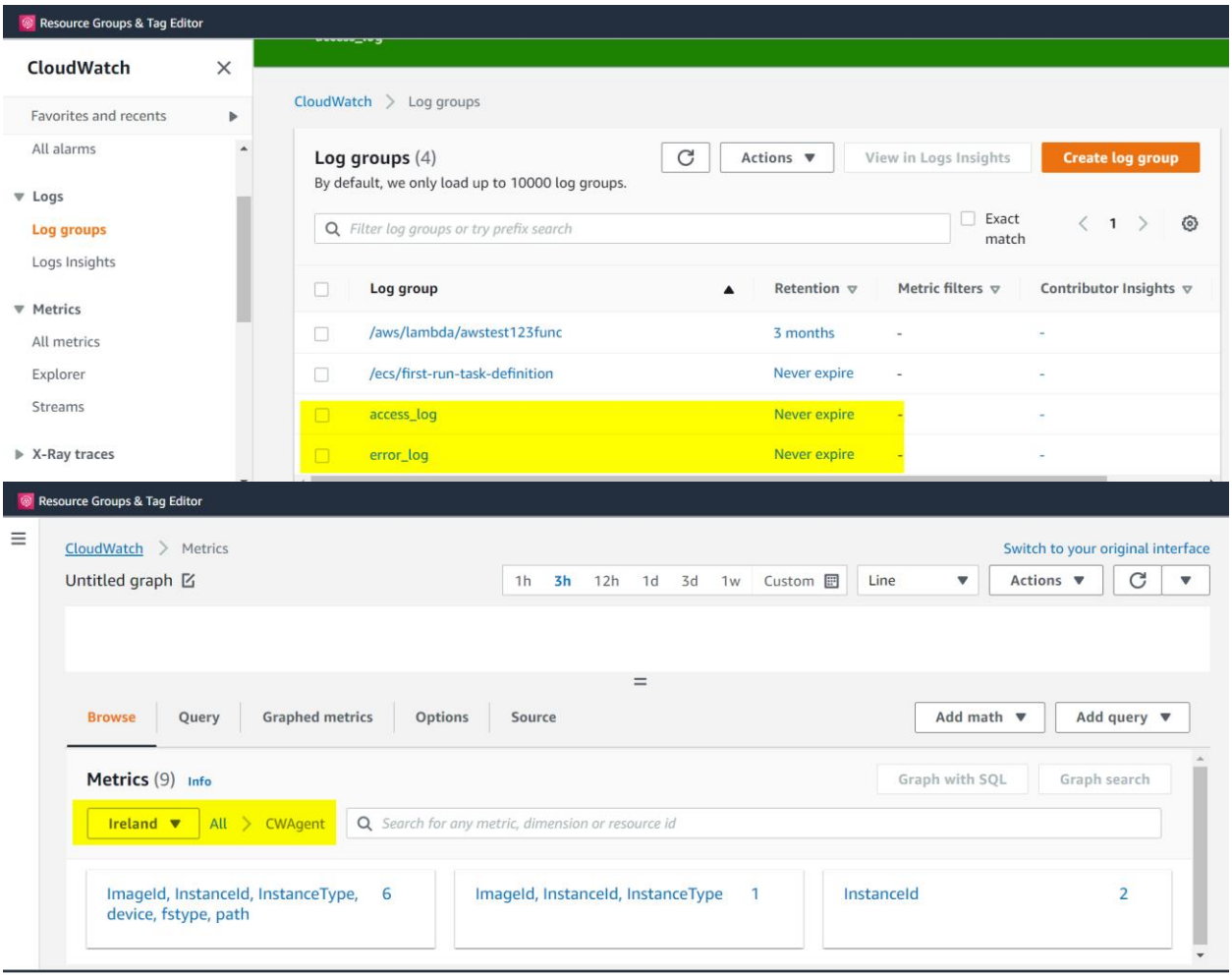
amazon-cloudwatch-agent has already been stopped

Created symlink from /etc/systemd/system/multi-user.target.wants/amazon-cloudwatch-agent.service to /etc/systemd/system/amazon-cloudwatch-agent.service.

Redirecting to /bin/systemctl restart amazon-cloudwatch-agent.service

sudo /opt/aws/amazon-cloudwatch-agent/bin/amazon-cloudwatch-agent-ctl -m ec2 -a status

CloudWatch Log Groups, Agent, LoGroupFilter:



Troubleshooting in case of any issues:

https://aws.amazon.com/premiumsupport/knowledge-center/cloudwatch-push-logs-with-unified-agent/

Lambda function & EventBridge code to copy the data into data lake/ s3: