SAS Astrolabe

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ALL ABOUT ME

I'm Richard Wellum, a Kubernetes user and developer.

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TWO

ASTROLABE

2.1 Intro

This is an application to discover Kubernetes Cluster resource metrics, in particular memory and disk usage across nodes.

Most available tools focus on memory and cpu, and not the physical/virtual disk usage.

This tool uses krew kubectl plugins, resource-capacity and df-pv as well as deploying a daemonset to all nodes that runs commands, the data is then pulled from the logs and displayed to the user.

- This link provides lots of useful info about pulling resources: https://github.com/kubernetes/kubernetes/issues/17512

In verbose mode a number of additional plugins are used to provide more information.

Effectively this is a docker image that when deployed executes a bash script `astrolabe.sh` that executes the kubectl plugins, and also deploys a daemonset to gather the data. `astrolabe.sh` contains logic to wait for the daemonset to deploy and log, and logic to display the output in a readible manner.

The output can be scaled to be very high verbosity or the default. The inputs accepted by Astrolabe and therefore the docker run command are:

- VERBOSE - true/false - turn on and report from every tool (default false)

2.2 Usage

The user needs no access to the source code, just the docker run command below.

The assumption is that the user is running somewhere with access to ./kube/config and the user has ssh access to all the nodes.

2.2.1 No Verbosity - runs disk and memory daemonset

```
sudo docker run \
-it --rm \
--volume ${SSH_AUTH_SOCK}:/ssh-agent --env SSH_AUTH_SOCK=/ssh-agent \
--volume ${HOME}/.ssh/:/root/.ssh \
--volume ${HOME}/.kube/:/root/.kube \
rwellum/astrolabe:latest
```

2.2.2 Medium Verbosity - runs disk and memory daemonset, metrics server and df-pv

```
sudo docker run \
-it --rm \
--volume ${SSH_AUTH_SOCK}:/ssh-agent --env SSH_AUTH_SOCK=/ssh-agent \
--volume ${HOME}/.ssh/:/root/.ssh \
--volume ${HOME}/.kube/:/root/.kube \
-e VERBOSE='v' \
rwellum/astrolabe:latest
```

2.2.3 High Verbosity - runs every tool

```
sudo docker run \
-it --rm \
--volume ${SSH_AUTH_SOCK}:/ssh-agent --env SSH_AUTH_SOCK=/ssh-agent \
--volume ${HOME}/.ssh/:/root/.ssh \
--volume ${HOME}/.kube/:/root/.kube \
-e VERBOSE='vv' \
rwellum/astrolabe:latest
```

2.2.4 Defaults - Explicit

```
sudo docker run \
-it --rm \
--volume ${SSH_AUTH_SOCK}:/ssh-agent --env SSH_AUTH_SOCK=/ssh-agent \
--volume ${HOME}/.ssh/:/root/.ssh \
--volume ${HOME}/.kube/:/root/.kube \
-e DEBUG='false' -e VERBOSE='false' \
rwellum/astrolabe:latest
```

2.3 For the package maintainer

2.3.1 Building docker image

```
sudo docker build -t rwellum/astrolabe:latest .
```

2.3.2 Pushing docker image

```
sudo docker push rwellum/astrolabe:latest
```

2.3.3 Cleanup, build and push - expensive but saves on tags

```
sudo docker system prune -f
sudo docker rmi --force rwellum/astrolabe:latest
sudo docker build -t rwellum/astrolabe:latest . --no-cache
sudo docker push rwellum/astrolabe:latest
```

2.3.4 Debugging disk-checker

Check status of daemonset

```
kubectl describe daemonset disk-checker
kubectl get nodes
kubectl get nodes -o json
kubectl get no,ds,po -o json
```

2.3.5 Sphinx generating docs

This repo uses Sphinx for documentation.

2.3.6 Generating html

```
cd docs
make html
```

Built in: `_build/html`

2.3.7 Generating pdf

```
cd docs
make latexpdf
```

Built in: `_build/latex`

CHAPTER

THREE

SAMPLE OUTPUT

3.1 Command run

```
sudo docker run -it --rm --volume ${SSH_AUTH_SOCK}:/ssh-agent \
--env SSH_AUTH_SOCK=/ssh-agent --volume ${HOME}/.ssh/:/root/.ssh \
--volume ${HOME}/.kube/:/root/.kube rwellum/astrolabe:v1.0
```

3.2 Output

```
ubuntu@riwell-k8s-master:~/astrolabe$ ./astrolabe.sh
/*       _\|/_
         (o o)
 +----oOO-{_}-OOo-+
 |                |
 |  Starting...   |
 |                |
 +----------------*/
/*****************************
 *                           *
 *  Krew: installed plugins  *
 *                           *
 *****************************/

PLUGIN              VERSION
datadog             v0.3.0
df-pv               v0.2.7
doctor              v0.3.0
flame               v0.1.8
get-all             v1.3.6
graph               v0.1.1
krew                v0.4.0
pod-dive            v0.1.4
popeye              v0.7.1
resource-capacity   v0.4.0
sick-pods           v0.2.0
starboard           v0.7.1
status              v0.4.1
tail                v0.15.0
view-allocations    v0.9.2
view-utilization    v0.3.3
```

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```
/*************************************************************
 *                                                           *
 *  view-allocations: Allocated resources across this cluster:  *
 *                                                           *
 *************************************************************/

 Resource                                                 Requested  %Requested     Limit
↪%Limit  Allocatable   Free
  cpu                                                       950.0m         48%       0.0
↪ 0%          2.0    1.1
  └─ riwell-k8s-master                                      950.0m         48%       0.0
↪ 0%          2.0    1.1
     ├─ coredns-74ff55c5b-8klw9                             100.0m                   0.0
     ├─ coredns-74ff55c5b-bxdhs                             100.0m                   0.0
     ├─ etcd-riwell-k8s-master                              100.0m                   0.0
     ├─ kube-apiserver-riwell-k8s-master                    250.0m                   0.0
     ├─ kube-controller-manager-riwell-k8s-master           200.0m                   0.0
     ├─ kube-scheduler-riwell-k8s-master                    100.0m                   0.0
     └─ weave-net-rnwz2                                     100.0m                   0.0
  ephemeral-storage                                       100.0Mi          0%       0.0
↪ 0%        27.9G  27.8G
  └─ riwell-k8s-master                                    100.0Mi          0%       0.0
↪ 0%        27.9G  27.8G
     └─ etcd-riwell-k8s-master                            100.0Mi                   0.0
  memory                                                  440.0Mi          6%   340.0Mi
↪ 4%        7.7Gi  7.2Gi
  └─ riwell-k8s-master                                    440.0Mi          6%   340.0Mi
↪ 4%        7.7Gi  7.2Gi
     ├─ coredns-74ff55c5b-8klw9                            70.0Mi              170.0Mi
     ├─ coredns-74ff55c5b-bxdhs                            70.0Mi              170.0Mi
     ├─ etcd-riwell-k8s-master                            100.0Mi                0.0
     └─ weave-net-rnwz2                                   200.0Mi                0.0
  pods                                                        0.0          0%       0.0
↪ 0%        110.0  110.0
  └─ riwell-k8s-master                                        0.0          0%       0.0
↪ 0%        110.0  110.0

/*********************************************************
 *                                                       *
 *  view-utilization: Total Utilization of this Cluster:  *
 *                                                       *
 *********************************************************/

Resource   Requests  %Requests     Limits  %Limits  Allocatable  Schedulable
↪Free
CPU             950         47          0        0         2002         1052
↪1052
Memory    461373440          5  356515840        4   8244310016   7782936576
↪7782936576

/*****************************************************************
 *                                                               *
 *  view-utilization: Total Utilization of this Cluster (Human):  *
 *                                                               *
 *****************************************************************/

Resource   Req   %R   Lim  %L  Alloc  Sched  Free
```

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```
CPU        0.95  47%      0  0%       2    1.1   1.1
Memory     440M   5%  340M  4%    7.7G   7.2G  7.2G

/
↪*****************************************************************************************
 *                                                                                       ⌊
↪      *
 *  resource-capacity: total CPU and Memory resource requests and limits for all the⌊
↪pods  *
 *                                                                                       ⌊
↪      *
⌊
↪*****************************************************************************************/
↪

NODE                 NAMESPACE     POD                                                  ⌊
↪CONTAINER                  CPU REQUESTS   CPU LIMITS   MEMORY REQUESTS   MEMORY⌊
↪LIMITS

riwell-k8s-master    *             *                                                    *       ⌊
↪                    950m (47%)     0m (0%)       440Mi (5%)         340Mi (4%)
riwell-k8s-master    kube-system   weave-net-rnwz2                                      *       ⌊
↪                    100m (5%)      0m (0%)       200Mi (2%)         0Mi (0%)
riwell-k8s-master    kube-system   weave-net-rnwz2                                      weave   ⌊
↪                    50m (2%)       0m (0%)       100Mi (1%)         0Mi (0%)
riwell-k8s-master    kube-system   weave-net-rnwz2                                      weave-
↪npc                   50m (2%)       0m (0%)       100Mi (1%)         0Mi (0%)
riwell-k8s-master    kube-system   coredns-74ff55c5b-bxdhs                              *       ⌊
↪                    100m (5%)      0m (0%)       70Mi (0%)          170Mi (2%)
riwell-k8s-master    kube-system   coredns-74ff55c5b-bxdhs                              coredns⌊
↪                    100m (5%)      0m (0%)       70Mi (0%)          170Mi (2%)
riwell-k8s-master    kube-system   kube-apiserver-riwell-k8s-master                     *       ⌊
↪                    250m (12%)     0m (0%)       0Mi (0%)           0Mi (0%)
riwell-k8s-master    kube-system   kube-apiserver-riwell-k8s-master                     kube-
↪apiserver             250m (12%)     0m (0%)       0Mi (0%)           0Mi (0%)
riwell-k8s-master    kube-system   kube-scheduler-riwell-k8s-master                     *       ⌊
↪                    100m (5%)      0m (0%)       0Mi (0%)           0Mi (0%)
riwell-k8s-master    kube-system   kube-scheduler-riwell-k8s-master                     kube-
↪scheduler             100m (5%)      0m (0%)       0Mi (0%)           0Mi (0%)
riwell-k8s-master    kube-system   kube-proxy-hlf4g                                     *       ⌊
↪                    0m (0%)        0m (0%)       0Mi (0%)           0Mi (0%)
riwell-k8s-master    kube-system   kube-proxy-hlf4g                                     kube-
↪proxy                 0m (0%)        0m (0%)       0Mi (0%)           0Mi (0%)
riwell-k8s-master    kube-system   metrics-server-5d5c49f488-hj8cf                      *       ⌊
↪                    0m (0%)        0m (0%)       0Mi (0%)           0Mi (0%)
riwell-k8s-master    kube-system   metrics-server-5d5c49f488-hj8cf                      metrics-
↪server              0m (0%)        0m (0%)       0Mi (0%)           0Mi (0%)
riwell-k8s-master    kube-system   coredns-74ff55c5b-8klw9                              *       ⌊
↪                    100m (5%)      0m (0%)       70Mi (0%)          170Mi (2%)
riwell-k8s-master    kube-system   coredns-74ff55c5b-8klw9                              coredns⌊
↪                    100m (5%)      0m (0%)       70Mi (0%)          170Mi (2%)
riwell-k8s-master    kube-system   etcd-riwell-k8s-master                               *       ⌊
↪                    100m (5%)      0m (0%)       100Mi (1%)         0Mi (0%)
riwell-k8s-master    kube-system   etcd-riwell-k8s-master                               etcd    ⌊
↪                    100m (5%)      0m (0%)       100Mi (1%)         0Mi (0%)
riwell-k8s-master    kube-system   kube-controller-manager-riwell-k8s-master            *       ⌊
↪                    200m (10%)     0m (0%)       0Mi (0%)           0Mi (0%)
```

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```
riwell-k8s-master   kube-system   kube-controller-manager-riwell-k8s-master   kube-
↪controller-manager   200m (10%)     0m (0%)      0Mi (0%)          0Mi (0%)

/*********************************************************
 *                                                       *
 *  view-utilization: Overview of namespace utilization  *
 *                                                       *
 *********************************************************/

             CPU        Memory
Namespace     Req  Lim   Req   Lim
kube-system  0.95    0  440M  340M

/*****************************************************
 *                                                   *
 *  view-utilization: Breakdown of node utilization  *
 *                                                   *
 *****************************************************/

CPU   : _
Memory: _
                   CPU                    Memory
Node                Req   %R  Lim    %L   Req   %R   Lim    %L
riwell-k8s-master  0.95  47%    0    0%  440M   5%  340M    4%
```

CHAPTER

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INDICES AND TABLES

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