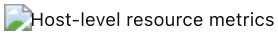
Harvester calculates resource metrics using data that is dynamically collected from the system. Host-level resource metrics are calculated and then aggregated to obtain the cluster-level metrics.

You can view resource-related metrics on the Harvester UI.

- **Hosts** screen: Displays host-level metrics

  
  Host-level resource metrics

- **Dashboard** screen: Displays cluster-level metrics

  
  Cluster-level resource metrics

CPU and Memory

The following sections describe the data sources and calculation methods for CPU and memory resources.

- Resource capacity: Baseline data
- Resource usage: Data source for the **Used** field on the **Hosts** screen
- Resource reservation: Data source for the **Reserved** field on the **Hosts** screen

Resource Capacity

In Kubernetes, a `Node` object is created for each host. `.status.allocatable.cpu` and `.status.allocatable.memory` represent the available CPU and memory resources of a host.

Example:

```
# kubectl get nodes -A -oyaml
apiVersion: v1
items:
- apiVersion: v1
  kind: Node
  metadata:
..
      management.cattle.io/pod-limits:
'{"cpu":"12715m","devices.kubevirt.io/kvm":"1","devices.kubevirt.io/tun":"1","devices.kubevirt.io/vhost-
net":"1","memory":"17104951040"}'
      management.cattle.io/pod-requests:
'{"cpu":"5657m","devices.kubevirt.io/kvm":"1","devices.kubevirt.io/tun":"1","devices.kubevirt.io/vhost-
net":"1","ephemeral-storage":"50M","memory":"9155862208","pods":"78"}'
      node.alpha.kubernetes.io/ttl: "0"
..
    name: harv41
    resourceVersion: "2170215"
    uid: b6f5850a-2fbc-4aef-8fbe-121dfb671b67
  spec:
    podCIDR: 10.52.0.0/24
    podCIDRs:
    - 10.52.0.0/24
    providerID: rke2://harv41
  status:
    addresses:
    - address: 192.168.122.141
      type: InternalIP
    - address: harv41
      type: Hostname
    allocatable:
      cpu: "10"
      devices.kubevirt.io/kvm: 1k
      devices.kubevirt.io/tun: 1k
```

```
      devices.kubevirt.io/vhost-net: 1k
      ephemeral-storage: "149527126718"
      hugepages-1Gi: "0"
      hugepages-2Mi: "0"
      memory: 20464216Ki
      pods: "200"
    capacity:
      cpu: "10"
      devices.kubevirt.io/kvm: 1k
      devices.kubevirt.io/tun: 1k
      devices.kubevirt.io/vhost-net: 1k
      ephemeral-storage: 153707984Ki
      hugepages-1Gi: "0"
      hugepages-2Mi: "0"
      memory: 20464216Ki
      pods: "200"
```

Resource Usage

CPU and memory usage data is continuously collected and stored in the `NodeMetrics` object. Harvester reads the data from `usage.cpu` and `usage.memory`.

Example:

```
# kubectl get NodeMetrics -A -oyaml
apiVersion: v1
items:
- apiVersion: metrics.k8s.io/v1beta1
  kind: NodeMetrics
  metadata:
...
    name: harv41
  timestamp: "2024-01-23T12:04:44Z"
  usage:
    cpu: 891736742n
    memory: 9845008Ki
  window: 10.149s
```

Resource Reservation

Harvester dynamically calculates the resource limits and requests of all pods running on a host, and updates the information to the annotations of the `NodeMetrics` object.

Example:

```
      management.cattle.io/pod-limits: '{"cpu":"12715m",...,"memory":"17104951040"}'
      management.cattle.io/pod-requests: '{"cpu":"5657m",...,"memory":"9155862208"}'
```

For more information, see Requests and Limits in the Kubernetes documentation.

Storage

Longhorn, which is the default Container Storage Interface (CSI) driver of Harvester, provides storage management features such as distributed block storage and tiering.

Reserved Storage in Longhorn

Longhorn allows you to specify the percentage of disk space that is not allocated to the default disk on each new Longhorn node. The default value is "30". For more information, see Storage Reserved Percentage For Default Disk in the Longhorn documentation.

Depending on the disk size, you can modify the default value using the embedded Longhorn UI.

Data Sources and Calculation

Harvester uses the following data to calculate metrics for storage resources.

- Sum of the `storageMaximum` values of all disks (`status.diskStatus.disk-name`): Total storage capacity
- Sum of the `storageAvailable` values of all disks (`status.diskStatus.disk-name`): Data source for the **Used** field on the **Hosts** screen
- Sum of the `storageReserved` values of all disks (`spec.disks`): Data source for the **Reserved** field on the **Hosts** screen

Example:

```
# kubectl get nodes.longhorn.io -n longhorn-system -oyaml

apiVersion: v1
items:
- apiVersion: longhorn.io/v1beta2
  kind: Node
  metadata:
..
    name: harv41
    namespace: longhorn-system
..
  spec:
    allowScheduling: true
    disks:
      default-disk-ef11a18c36b01132:
        allowScheduling: true
        diskType: filesystem
        evictionRequested: false
        path: /var/lib/harvester/defaultdisk
        storageReserved: 24220101427
        tags: []
..
  status:
..
    diskStatus:
      default-disk-ef11a18c36b01132:
..
        diskType: filesystem
        diskUUID: d2788933-8817-44c6-b688-dee414cc1f73
        scheduledReplica:
          pvc-95561210-c39c-4c2e-ac9a-4a9bd72b3100-r-20affeca: 2147483648
          pvc-9e83b2dc-6a4b-4499-ba70-70dc25b2d9aa-r-4ad05c86: 32212254720
          pvc-bc25be1e-ca4e-4818-a16d-48353a0f2f96-r-c7b88c60: 3221225472
          pvc-d9d3e54d-8d67-4740-861e-6373f670f1e4-r-f4c7c338: 2147483648
          pvc-e954b5fe-bbd7-4d44-9866-6ff6684d5708-r-ba6b87b6: 5368709120
        storageAvailable: 77699481600
        storageMaximum:   80733671424
        storageScheduled: 45097156608
    region: ""
    snapshotCheckStatus: {}
    zone: ""
```