



Mesos University

@jbclaramonte
@plopezFr
@jpthiery
@aurelienmaury



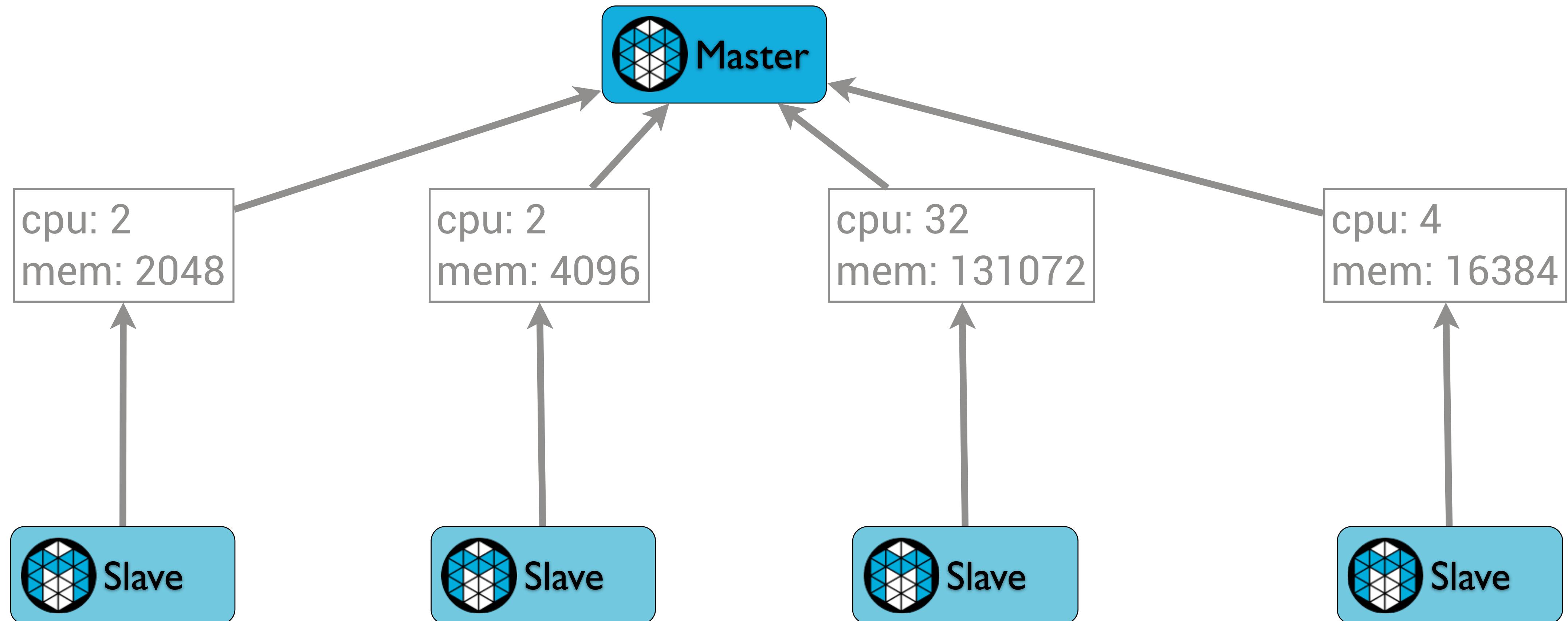
Agenda

- Mesos
- Frameworks
- Mesosphere
- Marathon





Ressources partagées





Resources

- 2 méthodes permettent de décrire les slaves du cluster
 - Resources
 - Tags (ou « Attributes »)

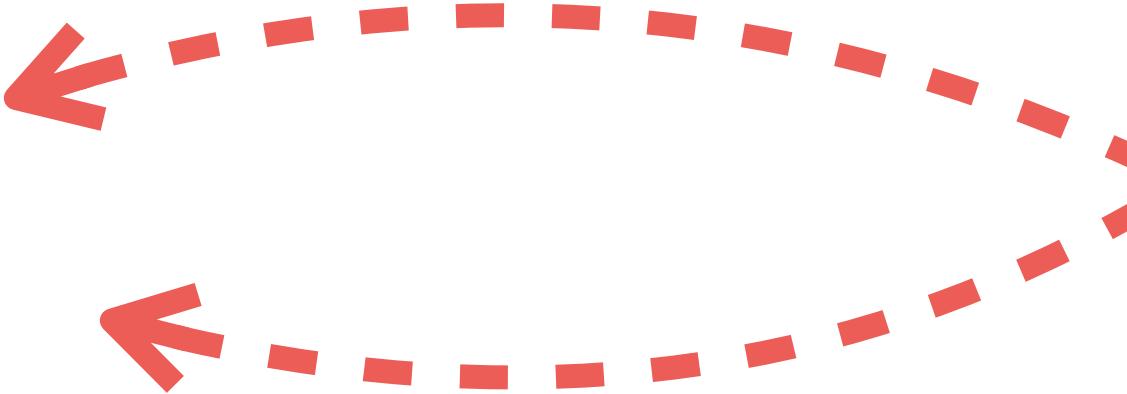


Resources

- Certaines resources types sont pré définies par Mesos
 - cpu
 - mem
 - disk
 - port



Resources

- Certaines resources types sont pré définies par Mesos
 - cpu
 - mem
 - disk
 - port
- 
- Obligatoire !



Resources

- Trois différentes types de resources
 - scalars
 - ranges
 - sets



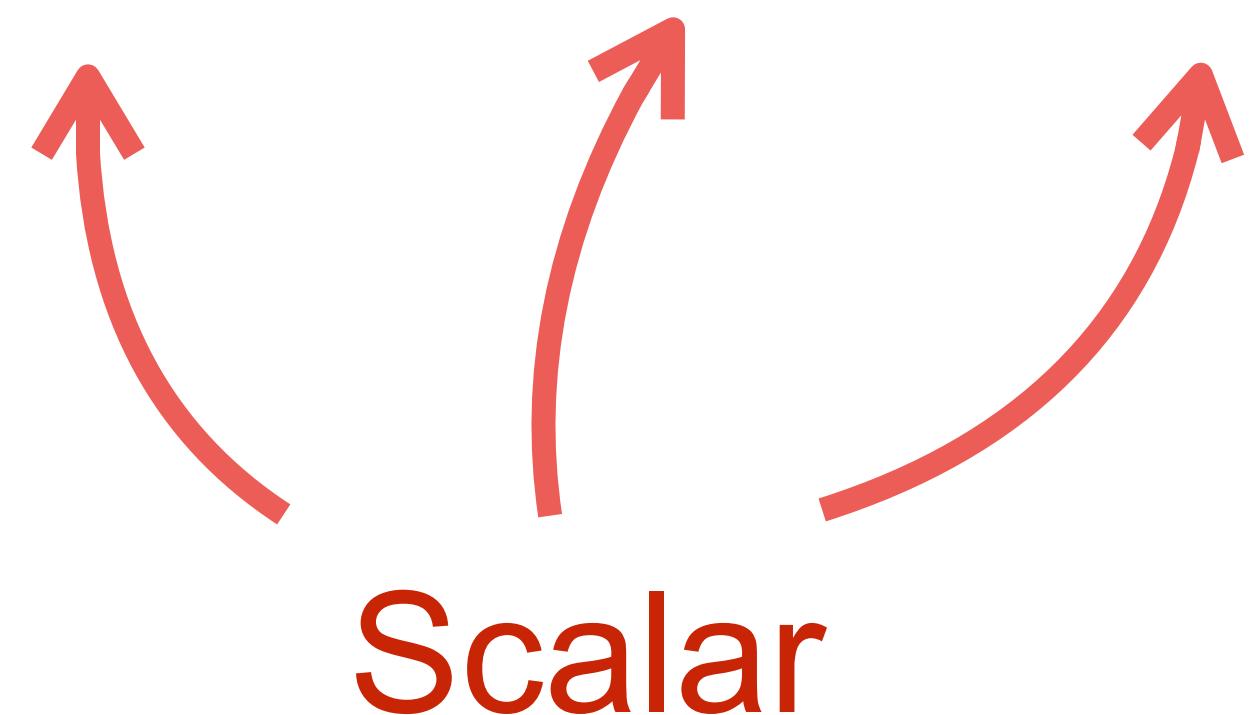
Resources

```
cpu:24;mem:24576;disk:409600;ports:[21000-24000];disks:{1,2,3,4,5,6,7,8,9}
```



Resources

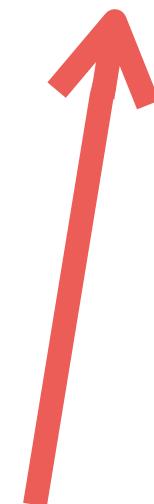
cpu:24;mem:24576;disk:409600;ports:[21000-24000];disks:{1,2,3,4,5,6,7,8,9}





Resources

```
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```

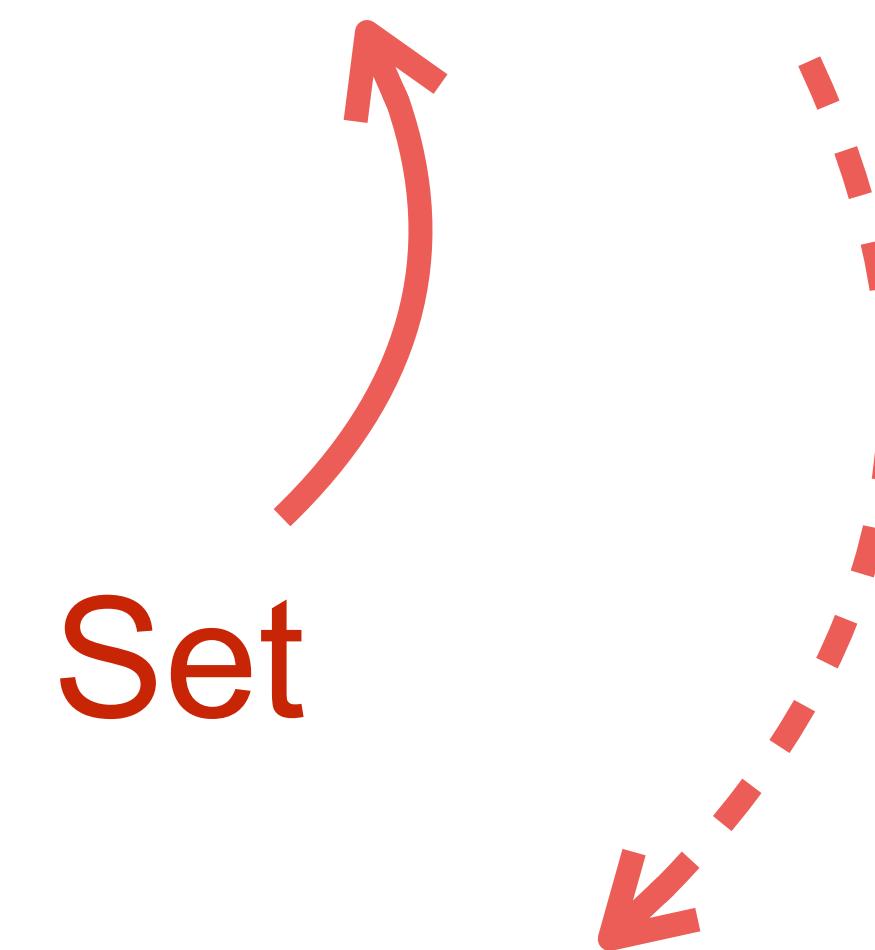


Range



Resources

cpu:24;mem:24576;disk:409600;ports:[21000-24000];disks:{1,2,3,4,5,6,7,8,9}



par exemple /mnt/disk/{diskNum}



Mesos: Web UI

Mesos Frameworks Slaves Offers

Cluster: (Unnamed)
Server: 10.73.142.160:5050
Version: 0.21.1
Built: 2 months ago by root
Started: a month ago
Elected: a month ago

LOG

| Slaves | |
|-------------|---|
| Activated | 3 |
| Deactivated | 0 |

Tasks

| | |
|----------|-----|
| Staged | 423 |
| Started | 0 |
| Finished | 111 |
| Killed | 269 |
| Failed | 39 |
| Lost | 0 |

Resources

| | CPU | Mem |
|---------|-------|--------|
| Total | 3 | 8.0 GB |
| Used | 1.600 | 1.3 GB |
| Offered | 0 | 0 B |
| Idle | 1.400 | 6.8 GB |

Active Tasks

| ID | Name | State | Started ▾ | Host | |
|---|------------------|---------|-------------|--|---------|
| restapi-example2.2c2bde4b-cdb3-11e4-b95a-22000a498ea0 | restapi-example2 | STAGING | | ip-10-35-136-88.eu-west-1.compute.internal | Sandbox |
| restapi-example.17f5831c-cef6-11e4-b95a-22000a498ea0 | restapi-example | RUNNING | 7 hours ago | ip-10-33-158-51.eu-west-1.compute.internal | Sandbox |
| chronos.648b4642-c96b-11e4-b95a-22000a498ea0 | chronos | RUNNING | a week ago | ip-10-73-133-66.eu-west-1.compute.internal | Sandbox |
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Completed Tasks

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| restapi-example2.ccd36909-cdb1-11e4-b95a-22000a498ea0 | restapi-example2 | FAILED | yesterday | yesterday | ip-10-35-136-88.eu-west-1.compute.internal | Sandbox |
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Mesos: Web UI



Framework



Framework

Framework = Application

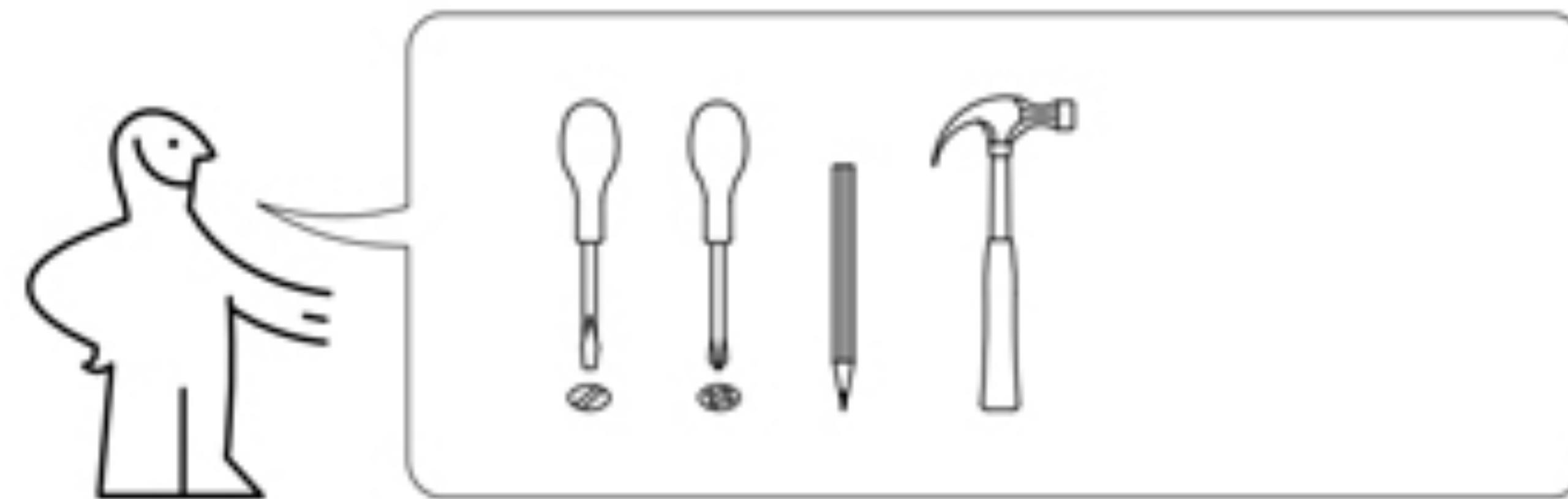


Frameworks

| | | | | | |
|-----------------------|--------------------------|---------------------|----------------------|----------------------------|-------------------------|
| Au Aurora | Cc Cray Chapel | Dp Dpark | Ch Chronos | Jk Jenkins | |
| Ma Marathon | Ex Exelixi | Ha Hadoop | Tq Torque | Ca Cassandra | |
| Sp SSSP | Mi MPI | Sk Spark | St Storm | Es ElasticSearch | Ht Hypertable |
| | | | | | |



Framework : API





API





Scheduler

- Est notifié par le master de la mise à disposition de ressource
- Demande l'exécution de tâches au master

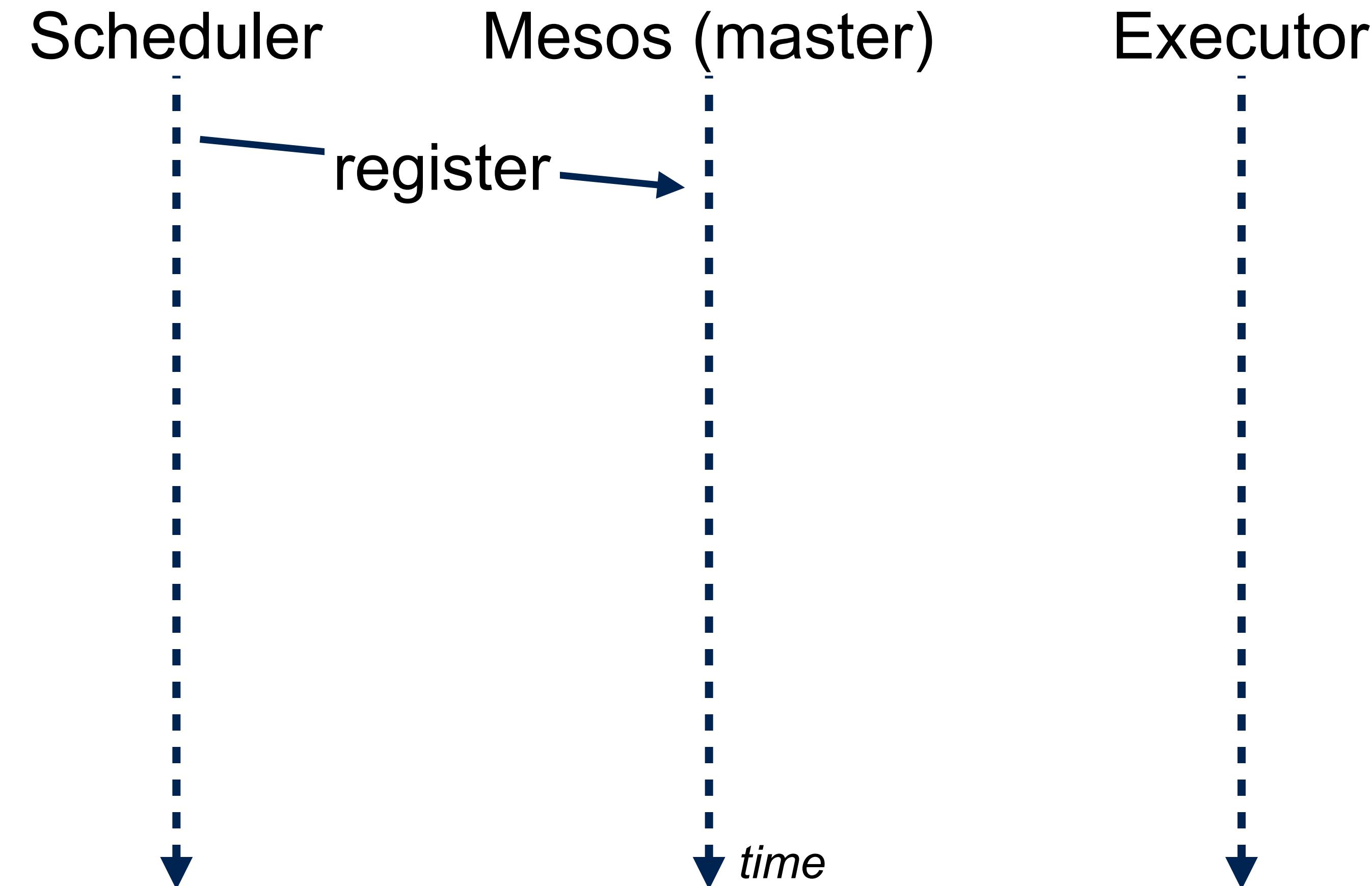


Executor

- Réalise les tâches soumises par le master

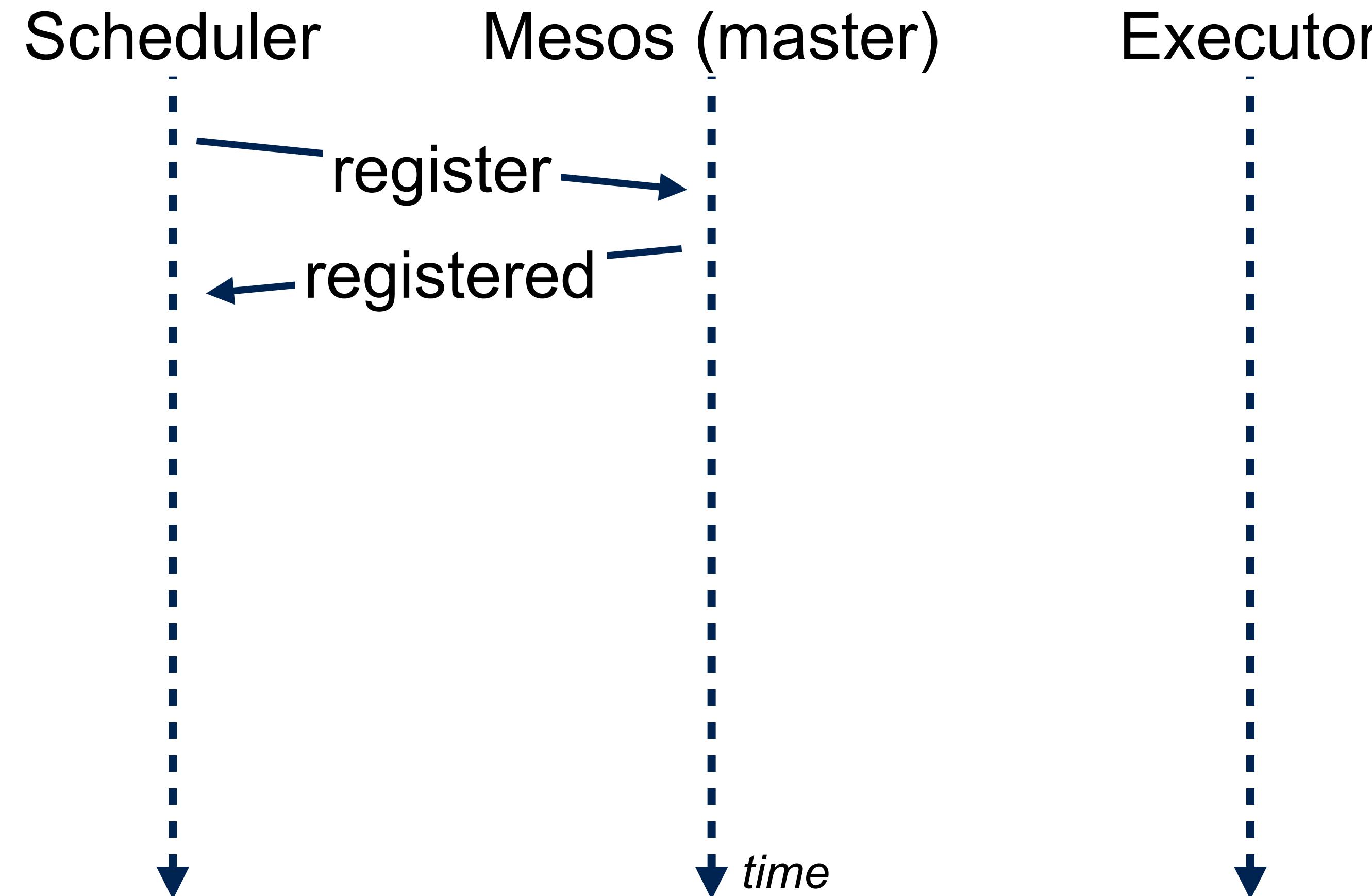


API



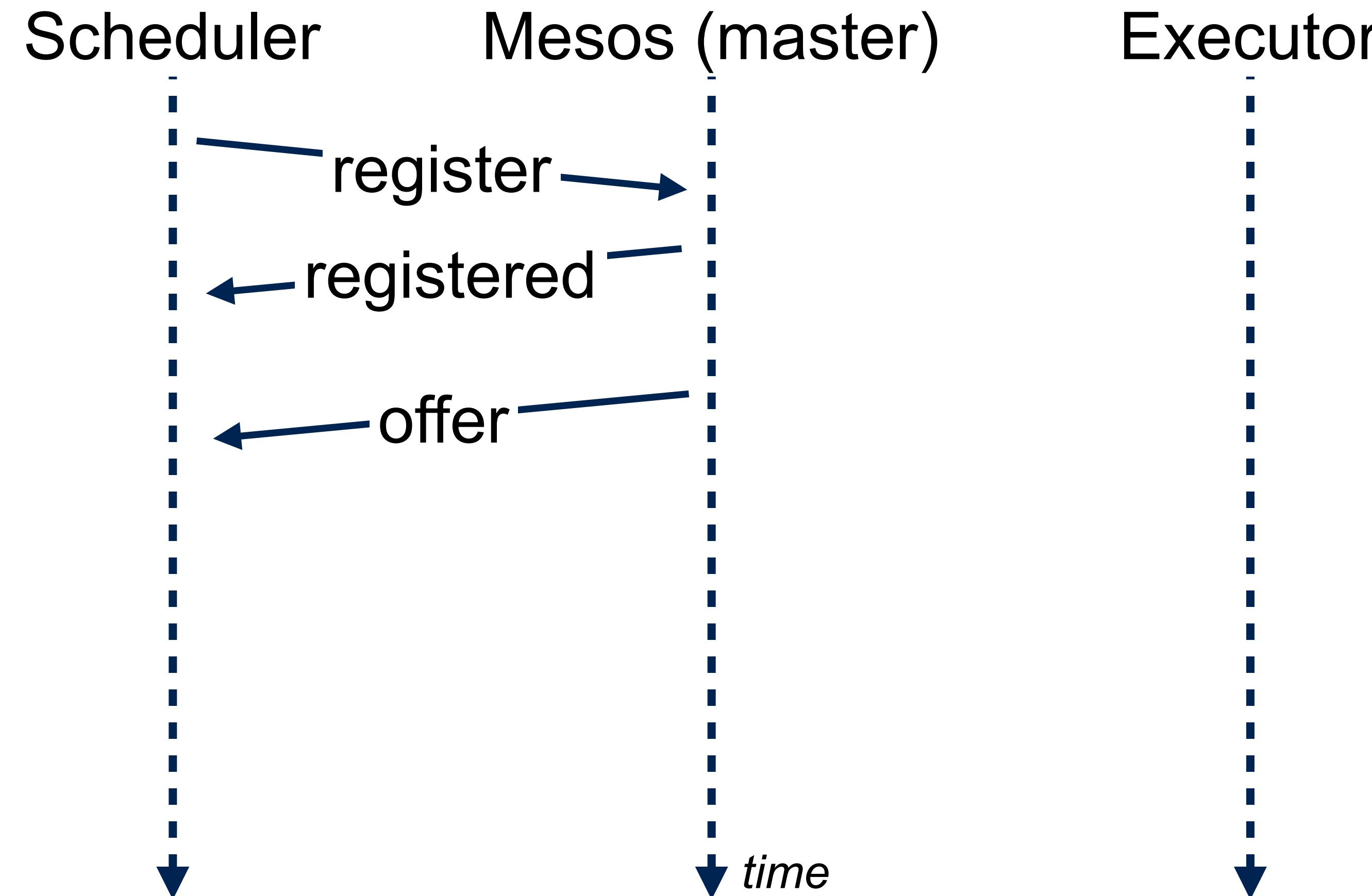


API



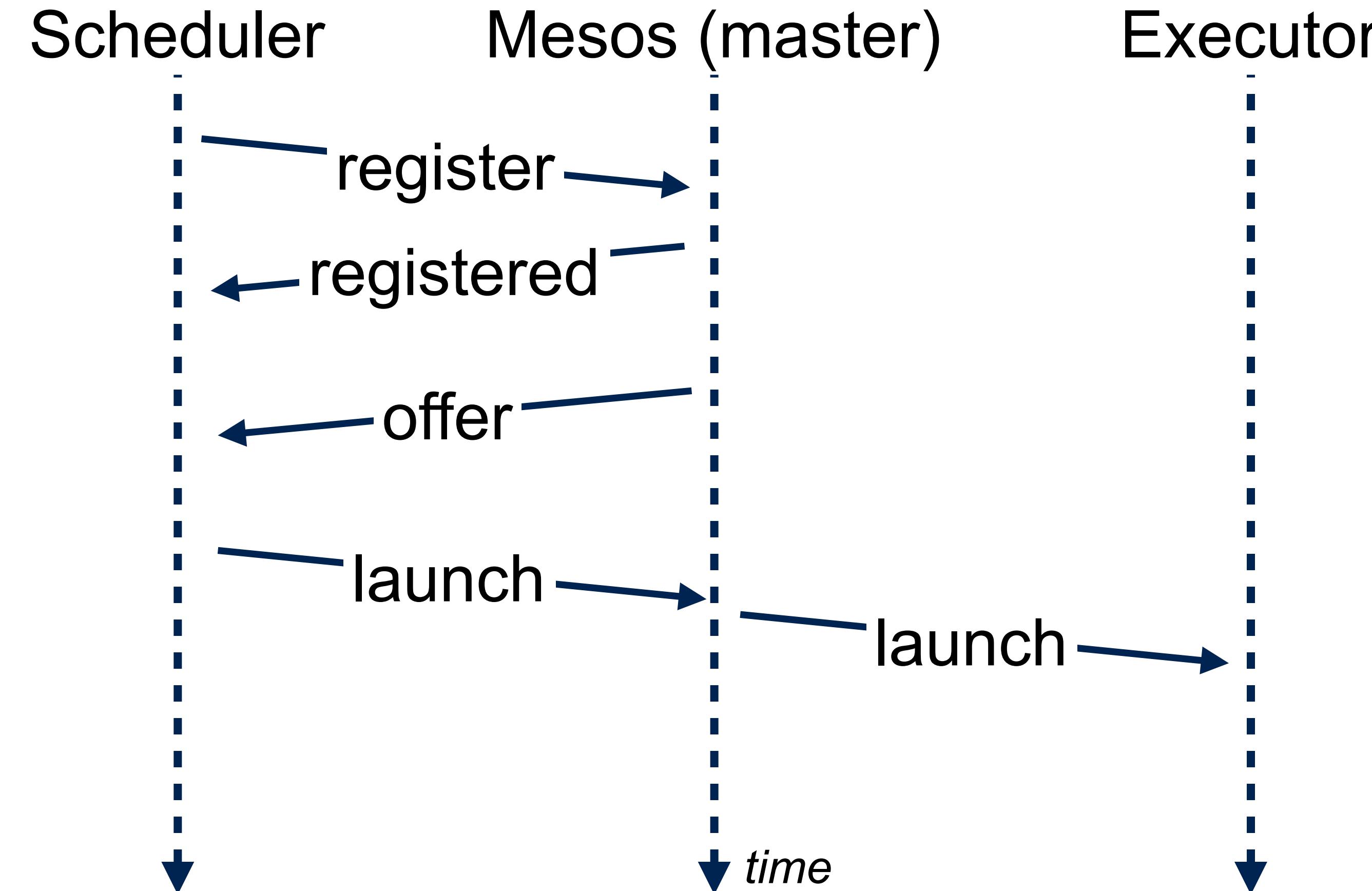


API



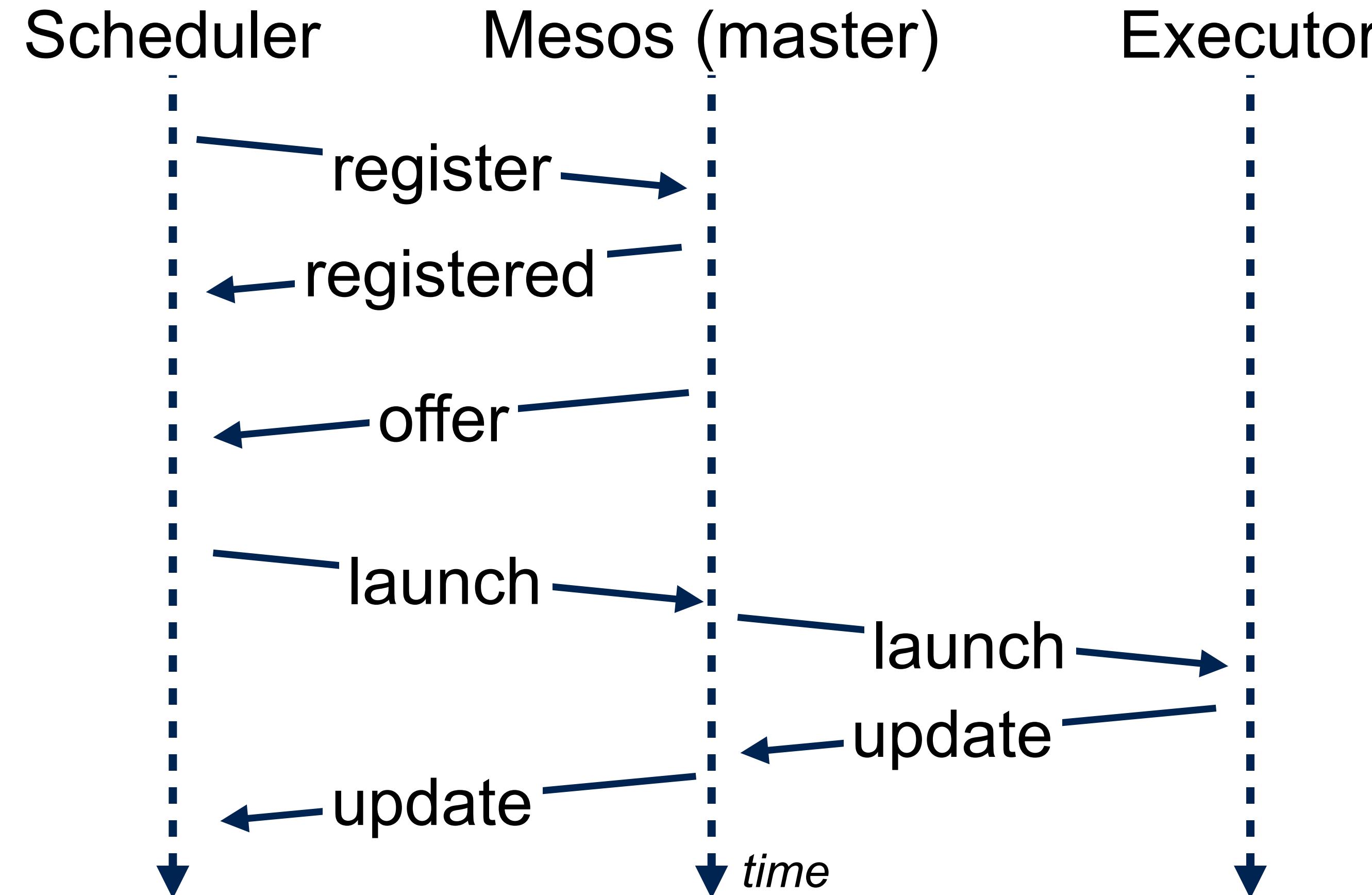


API





API





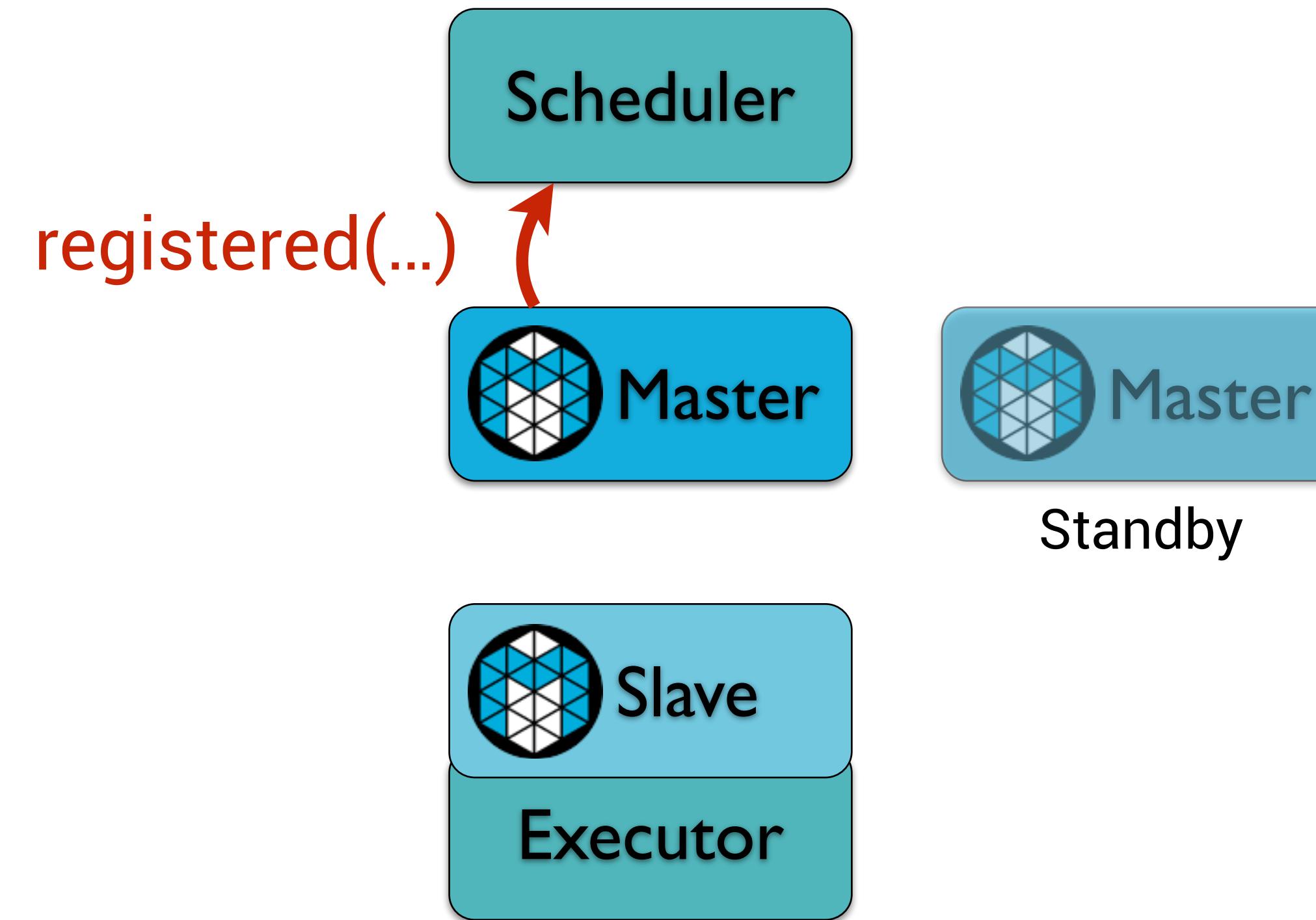
Framework : API



API du Scheduler



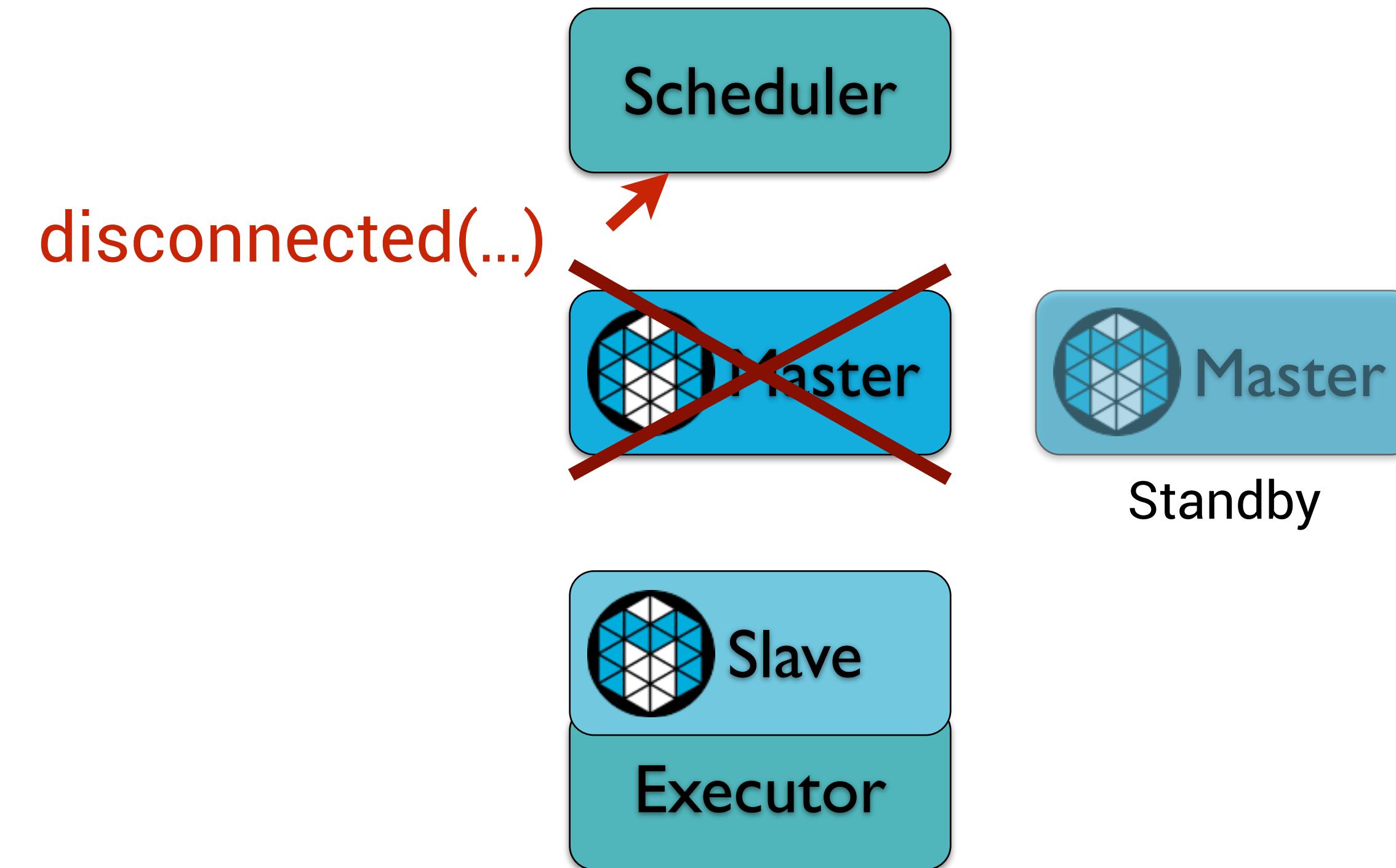
Scheduler : Lifecycle management



```
void registered(SchedulerDriver driver,  
FrameworkID fwkId,  
MasterInfo masterInfo);
```



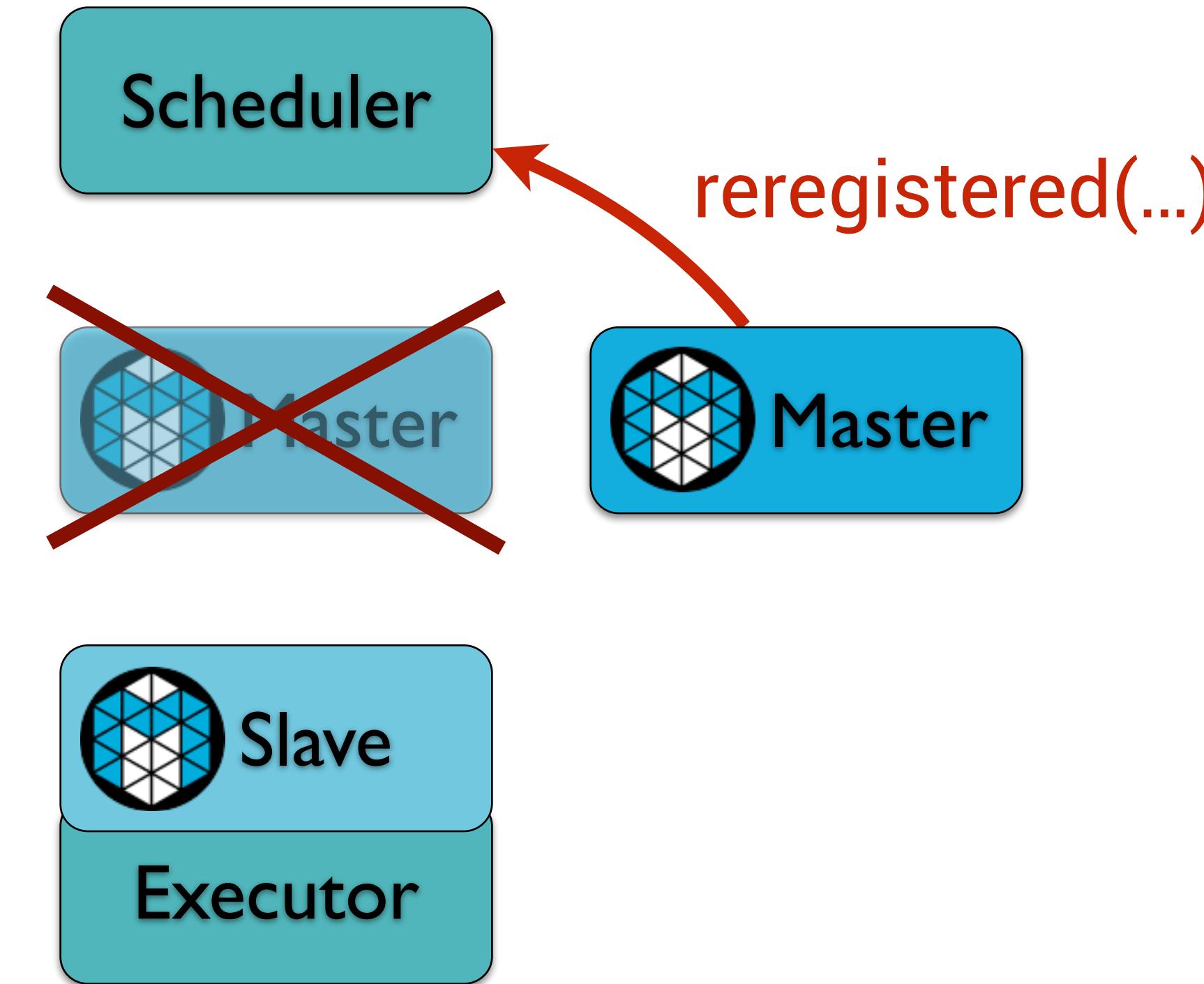
Scheduler : Lifecycle management



```
void disconnected(SchedulerDriver driver);
```



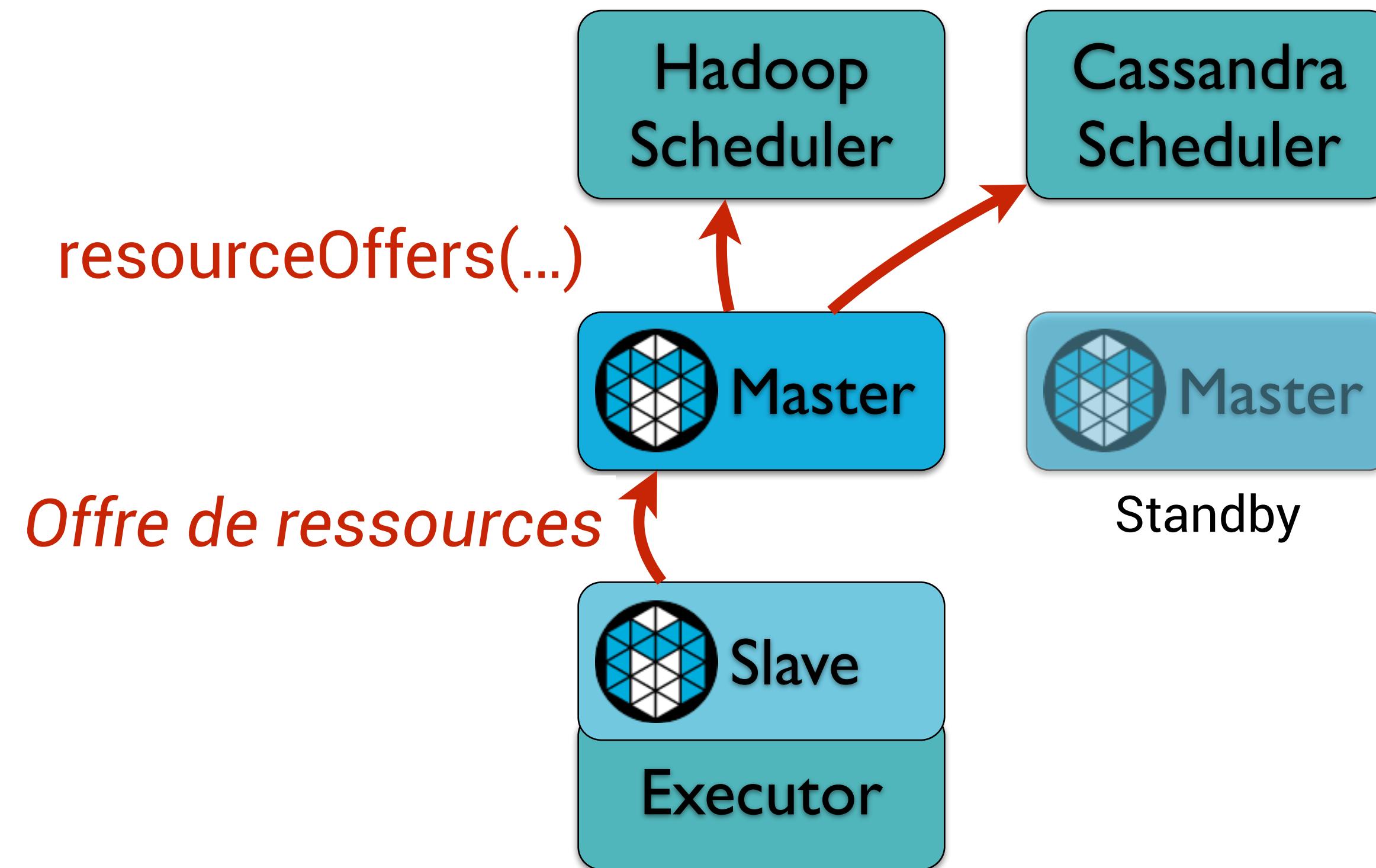
Scheduler : Lifecycle management



```
void reregistered(SchedulerDriver driver,  
                    MasterInfo masterInfo);
```



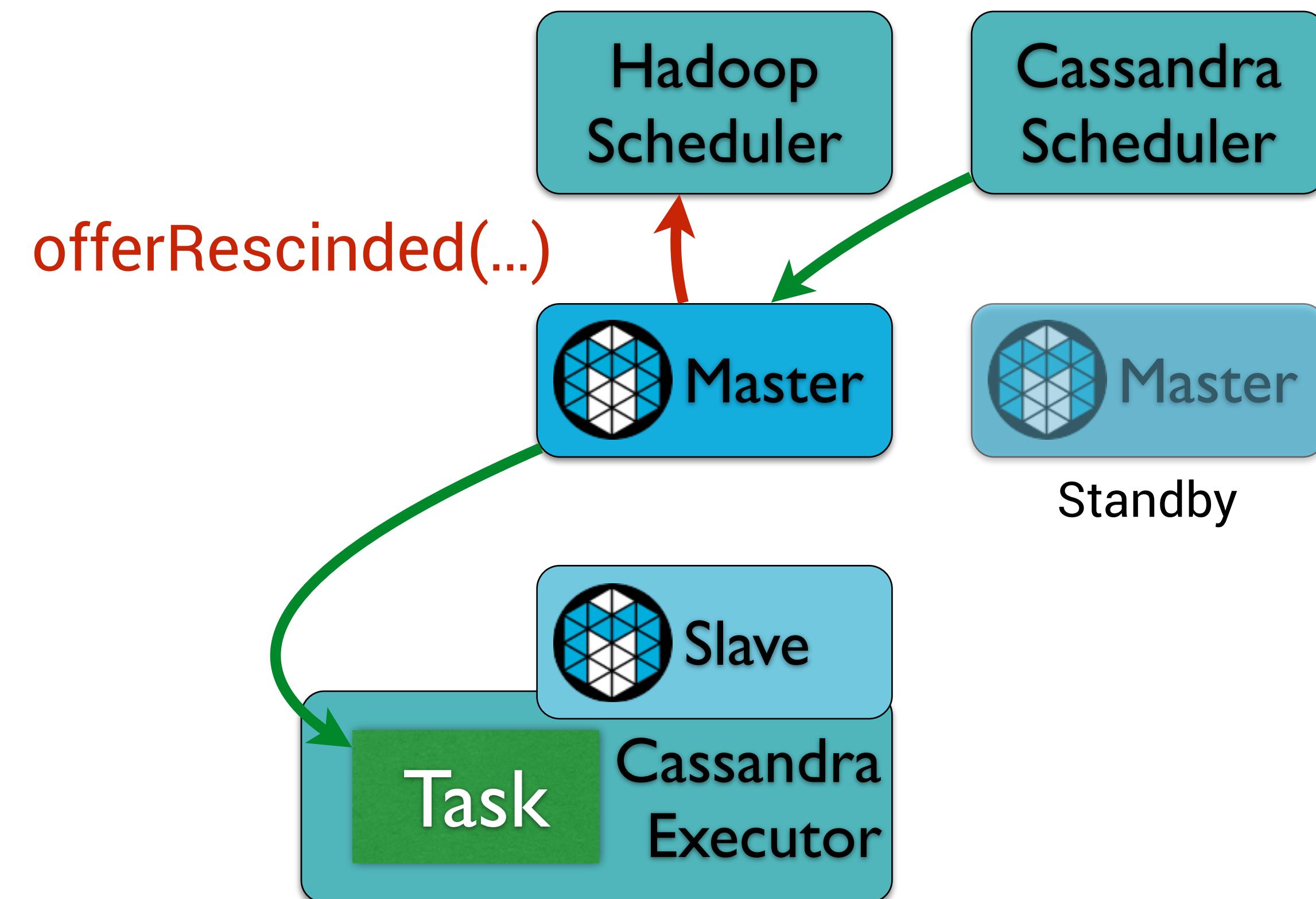
Scheduler : Resource Allocation



```
void resourceOffers (SchedulerDriver driver,  
List<Offer> offers);
```



Scheduler : Resource Allocation

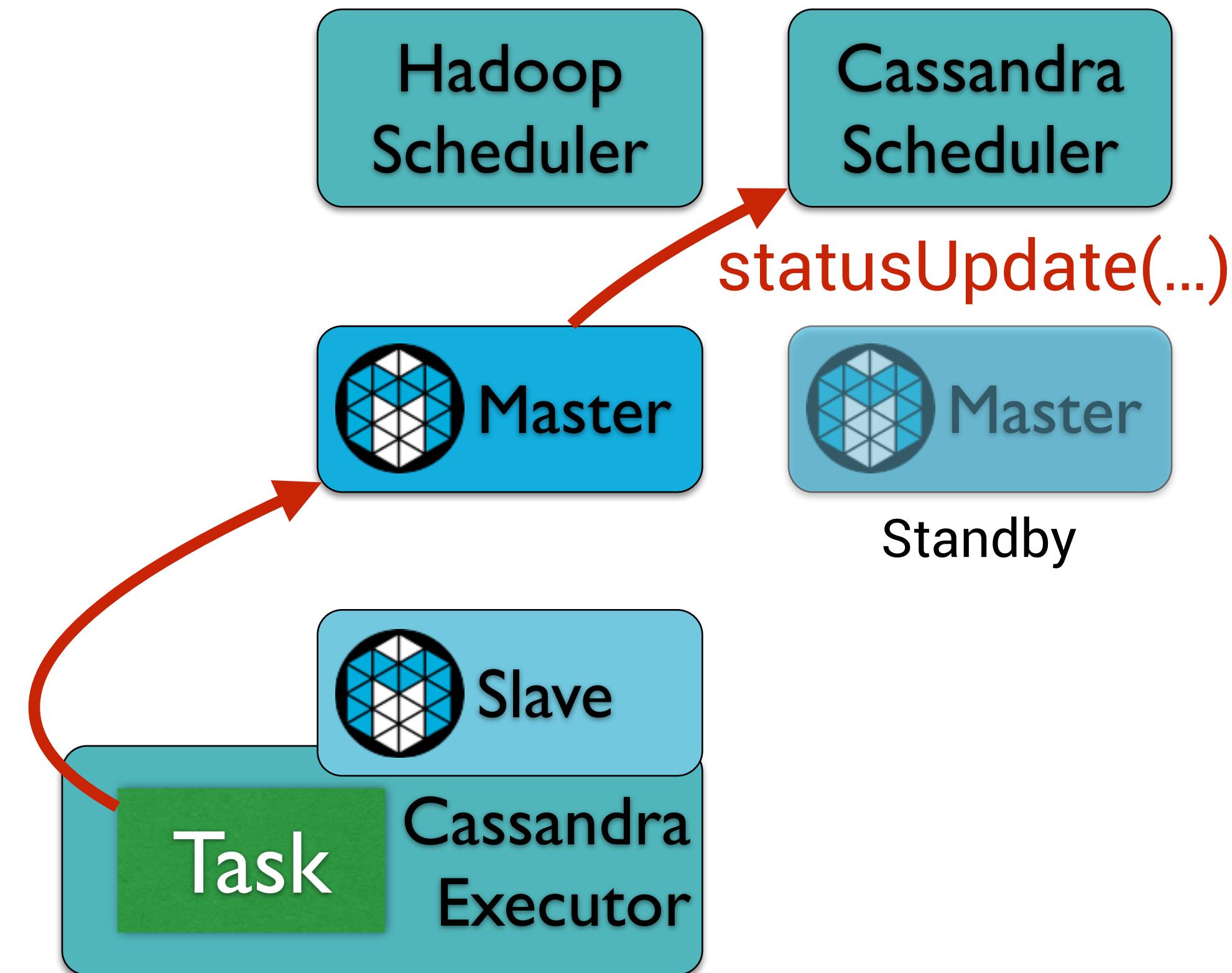


Le scheduler
Cassandra
exécute le premier la
tâche

```
void offerRescinded(SchedulerDriver driver,  
OfferID offerId);
```



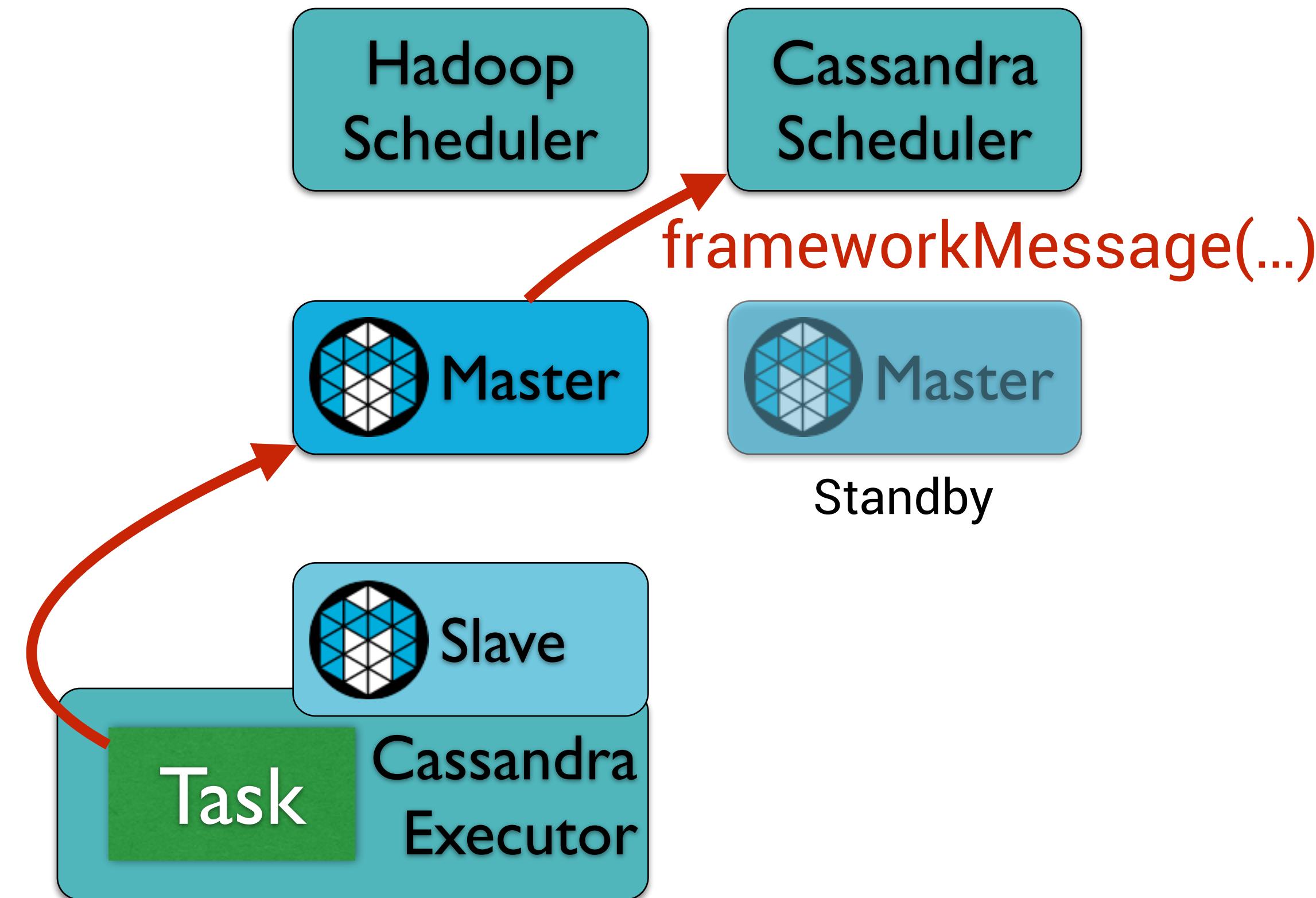
Scheduler : Communication



```
void statusUpdate (SchedulerDriver driver,  
                    TaskStatus taskStatus);
```



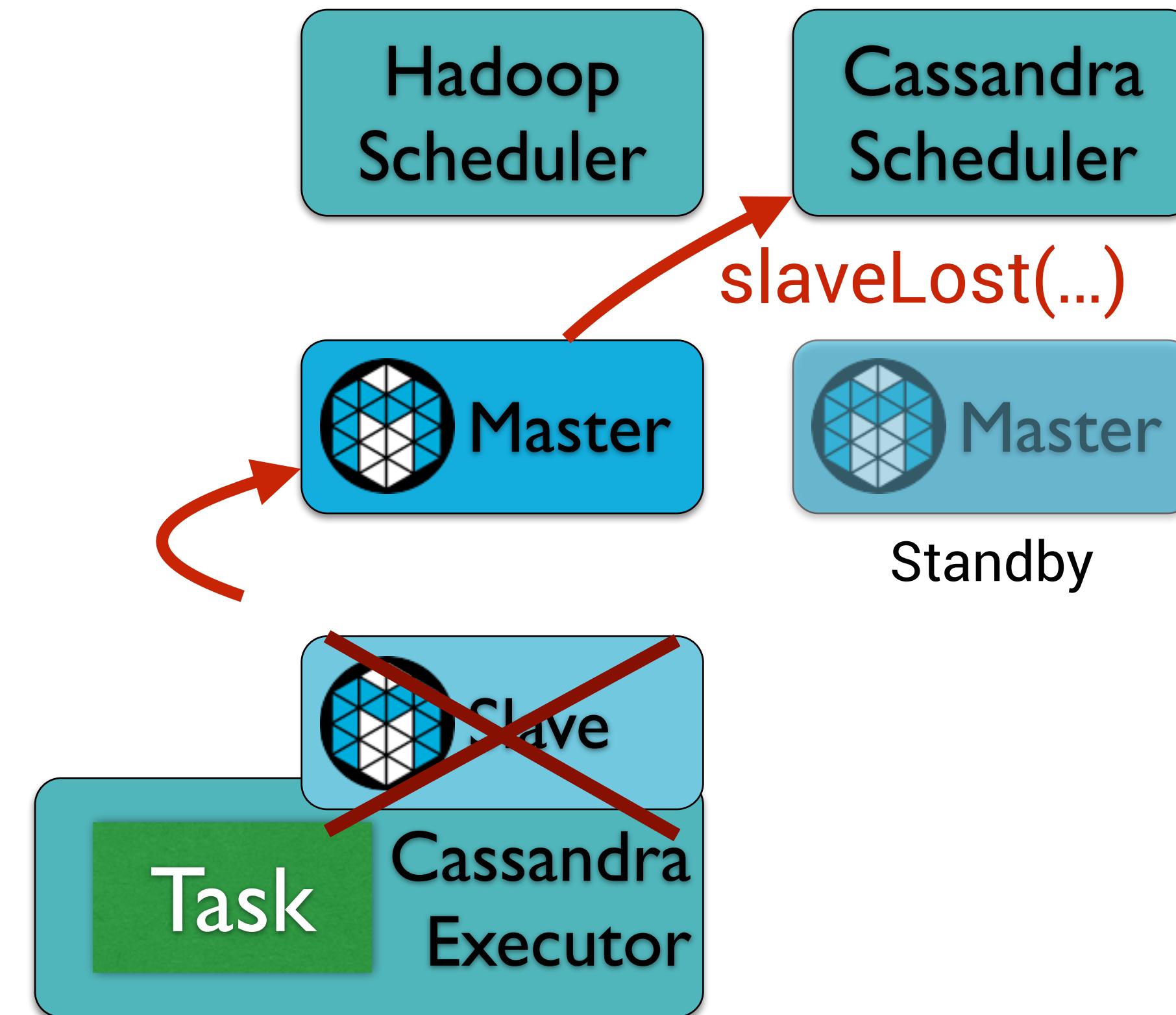
Scheduler : Communication



```
void frameworkMessage(SchedulerDriver driver,  
                      ExecutorID execId,  
                      SlaveID slaveId, byte[] message);
```



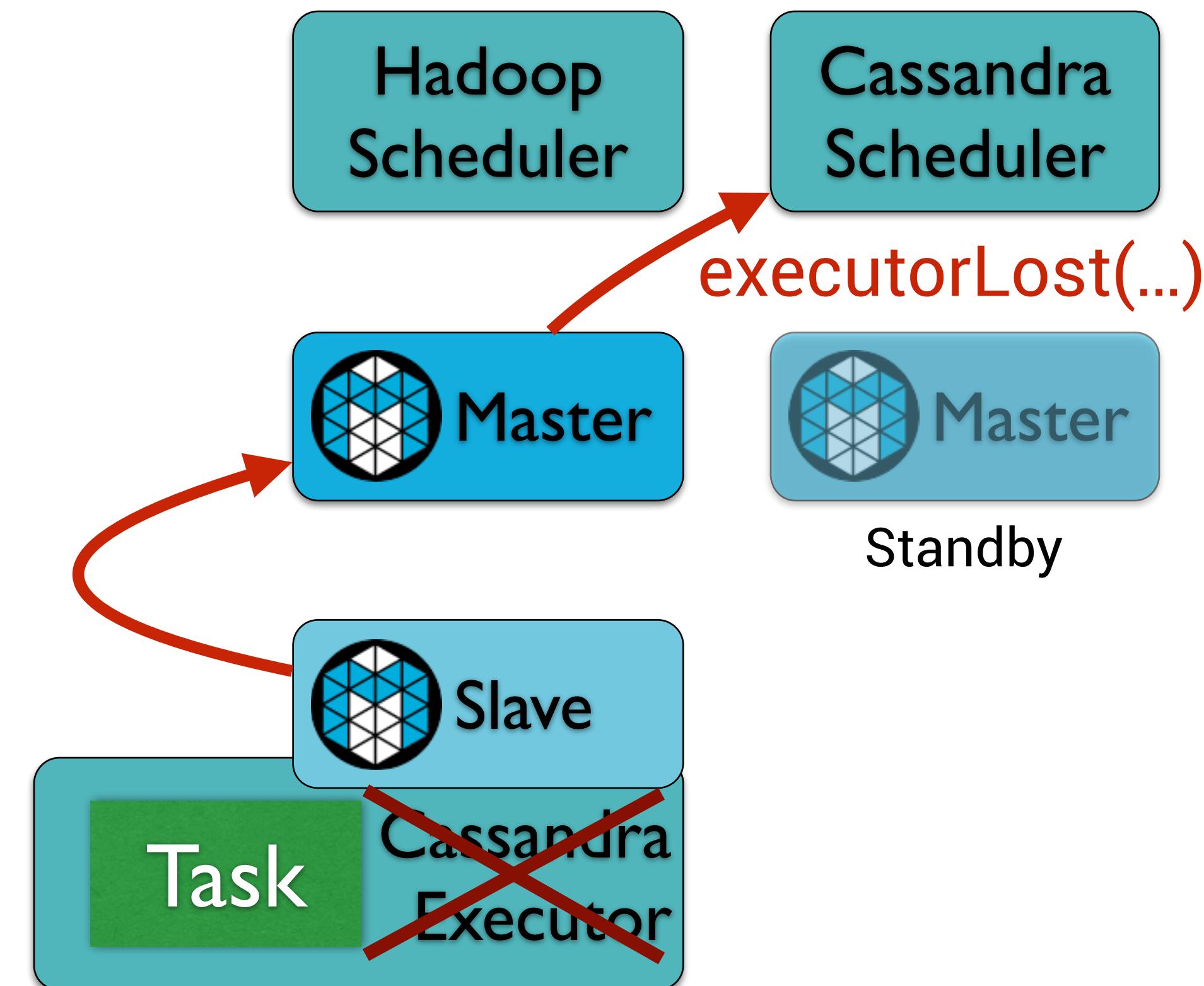
Scheduler : Error events



```
void slaveLost(SchedulerDriver driver, SlaveID slaveId);
```



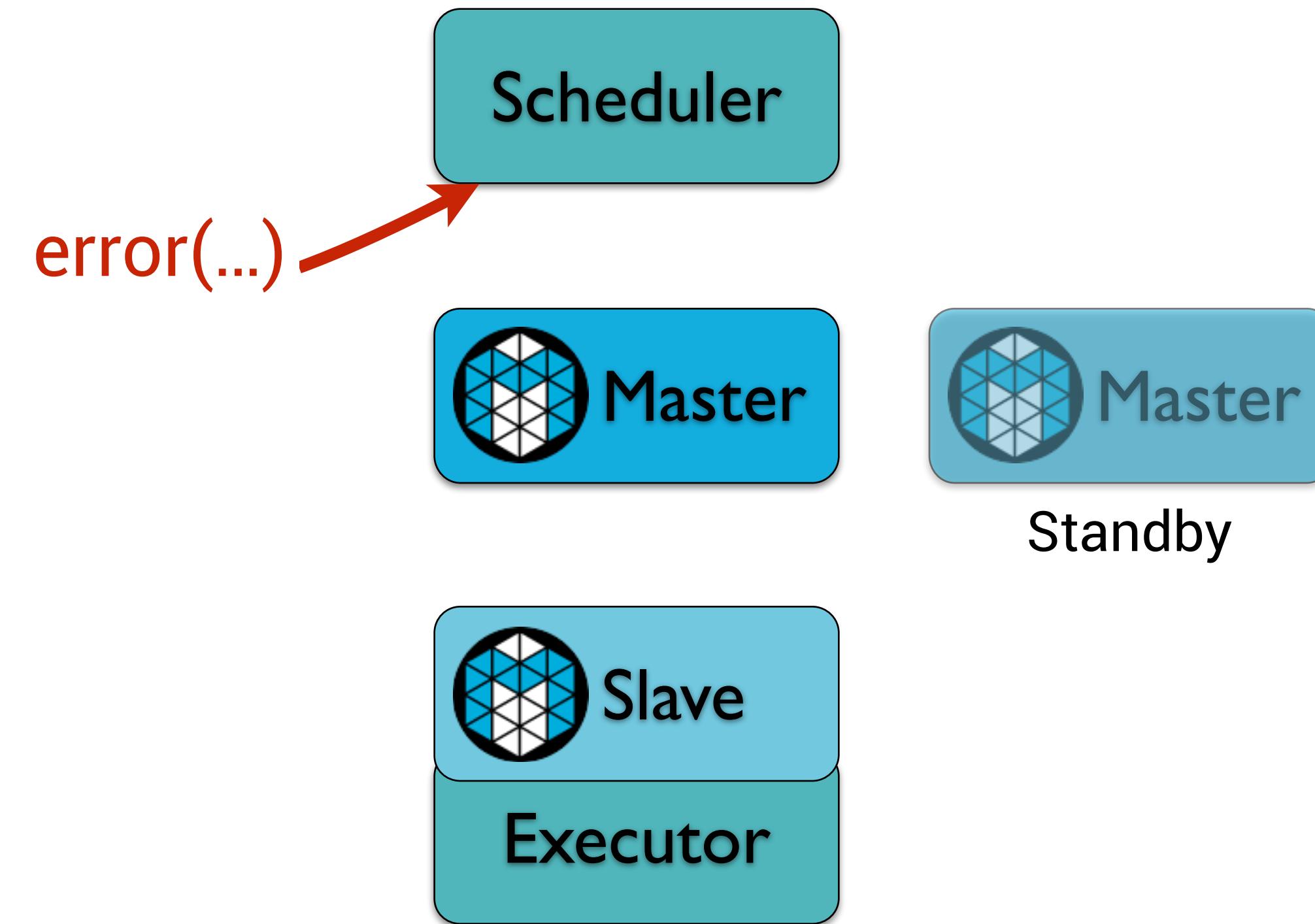
Scheduler : Error events



```
void executorLost(SchedulerDriver driver, ExecutorID execId,  
SlaveID slaveId, int status);
```



Scheduler : Error events



```
void error(SchedulerDriver driver, String message);
```



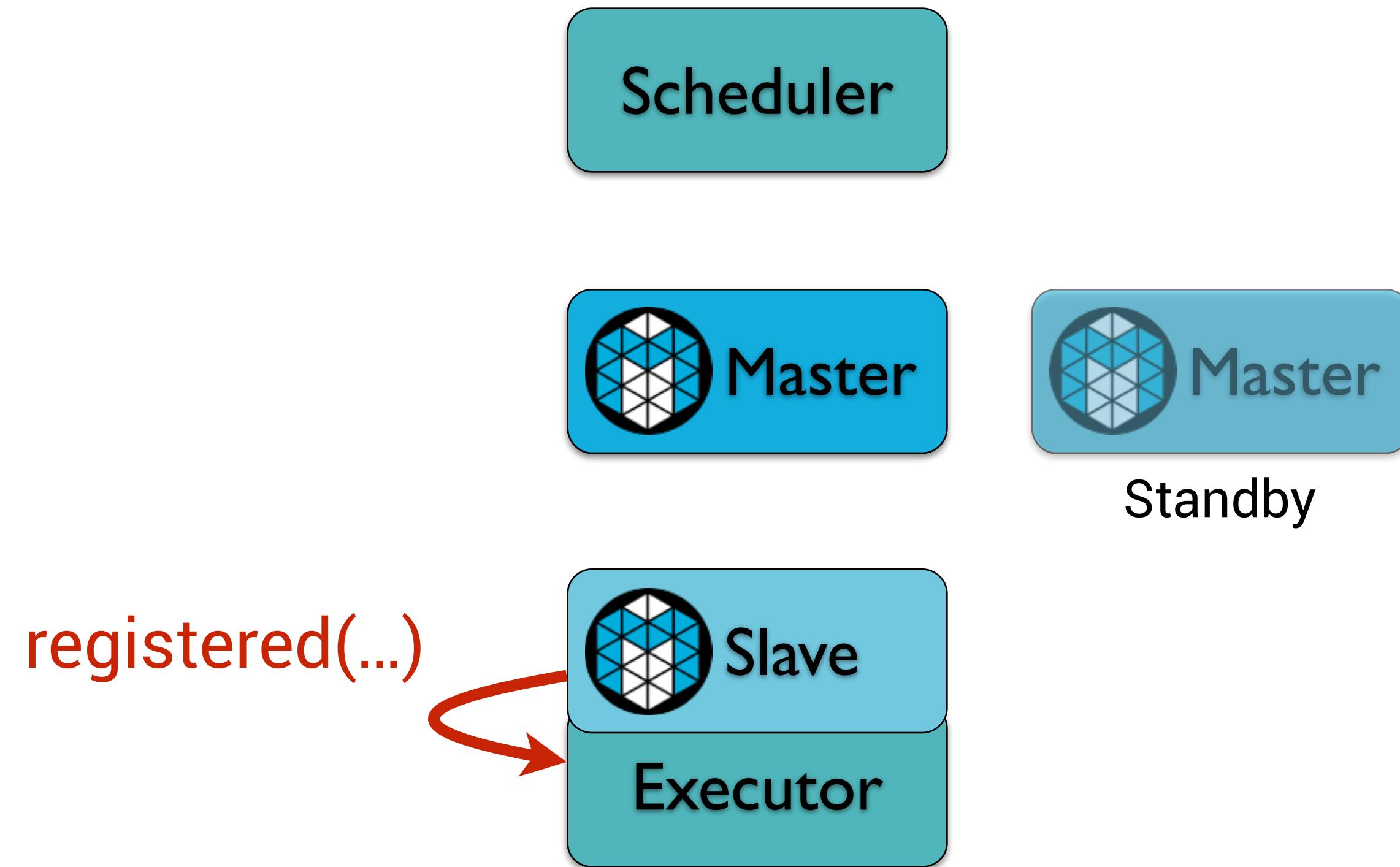
Framework : API



API de l'Executor



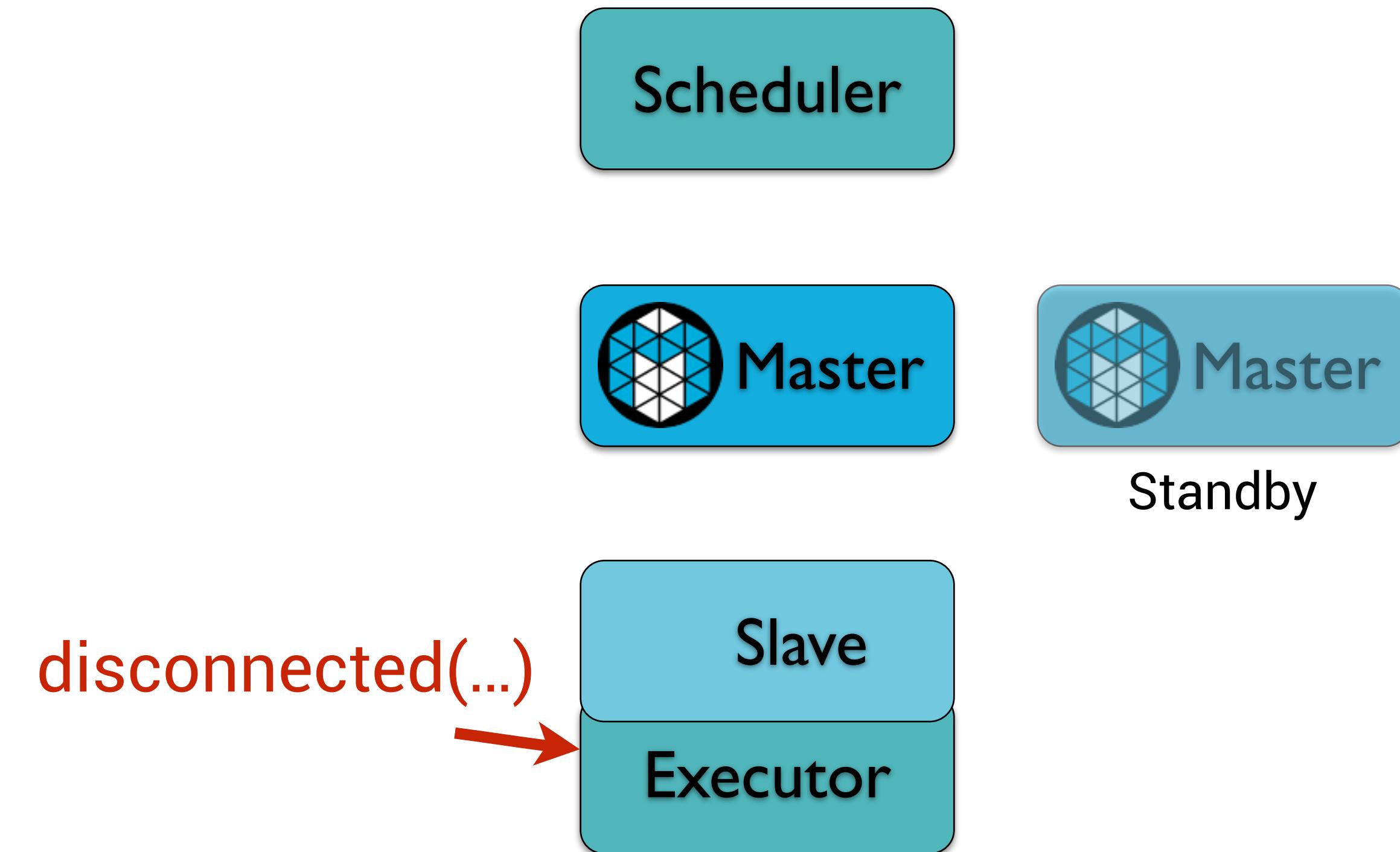
Executor : Lifecycle management



```
void registered  
  (ExecutorDriver driver, ExecutorInfo execInfo,  
   FrameworkInfo fwkInfo, SlaveInfo slaveInfo);
```



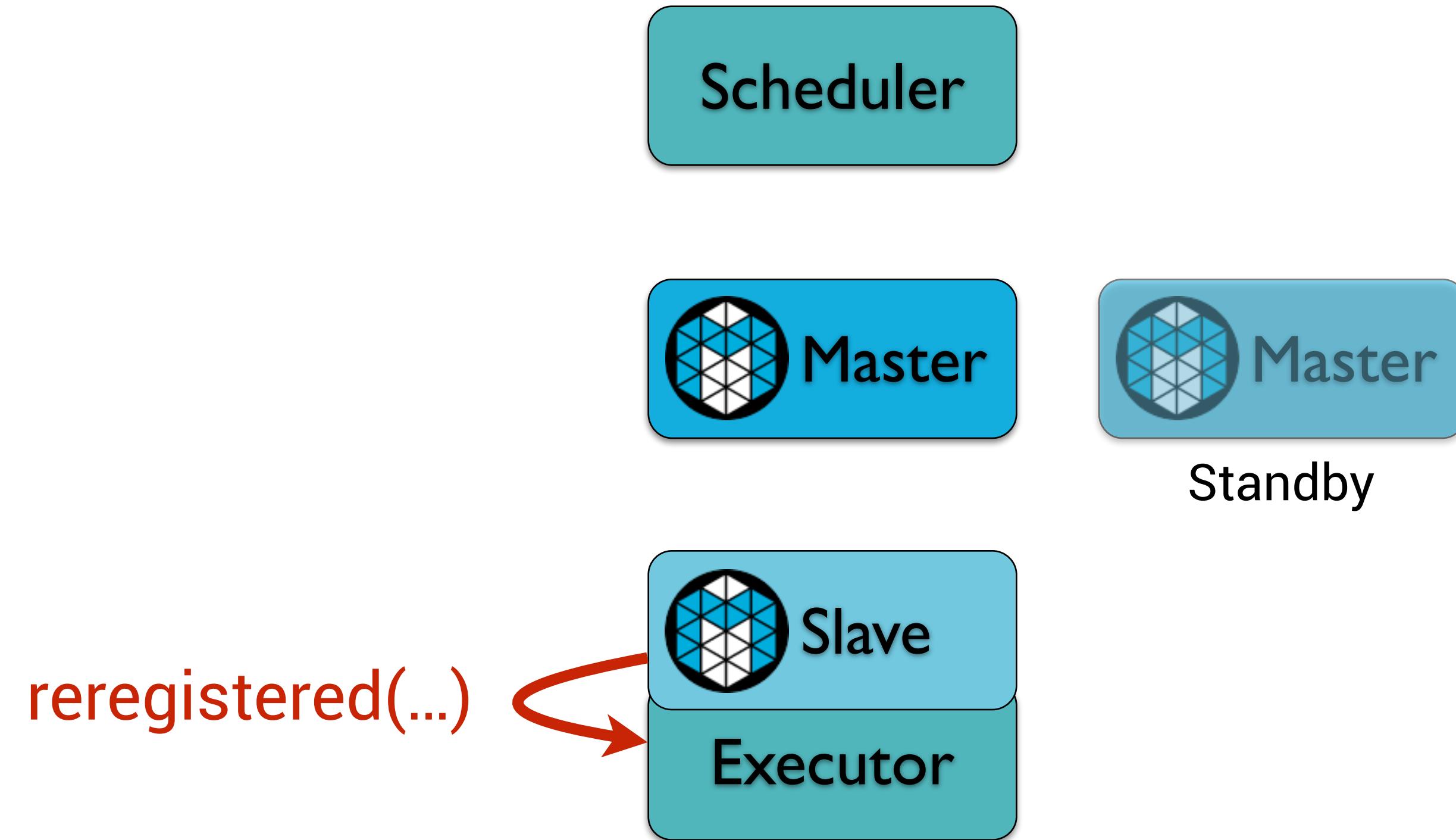
Executor : Lifecycle management



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void disconnected(ExecutorDriver driver);
```



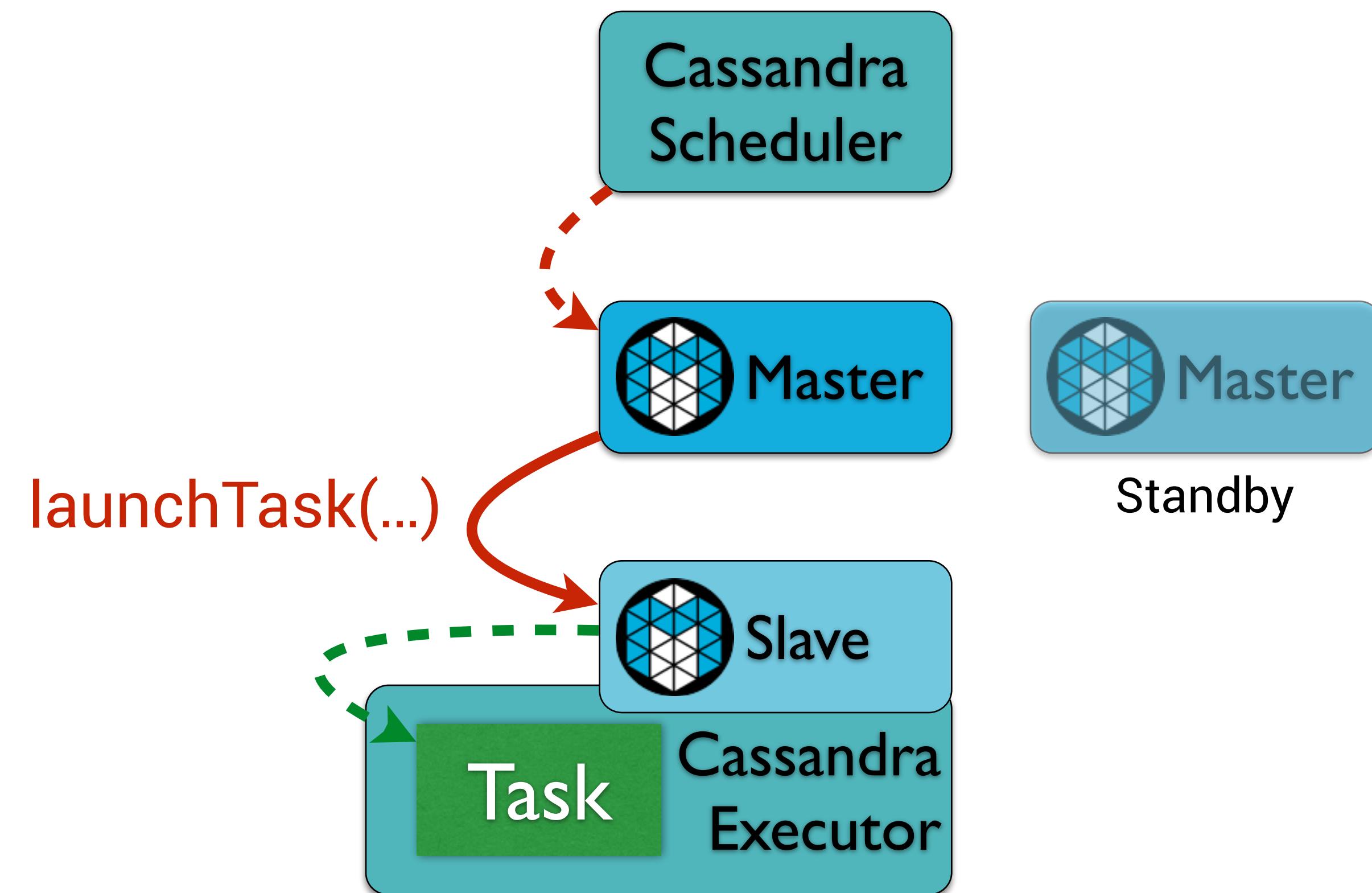
Executor : Lifecycle management



```
void reregistered(ExecutorDriver driver,  
                    SlaveInfo slaveInfo);
```



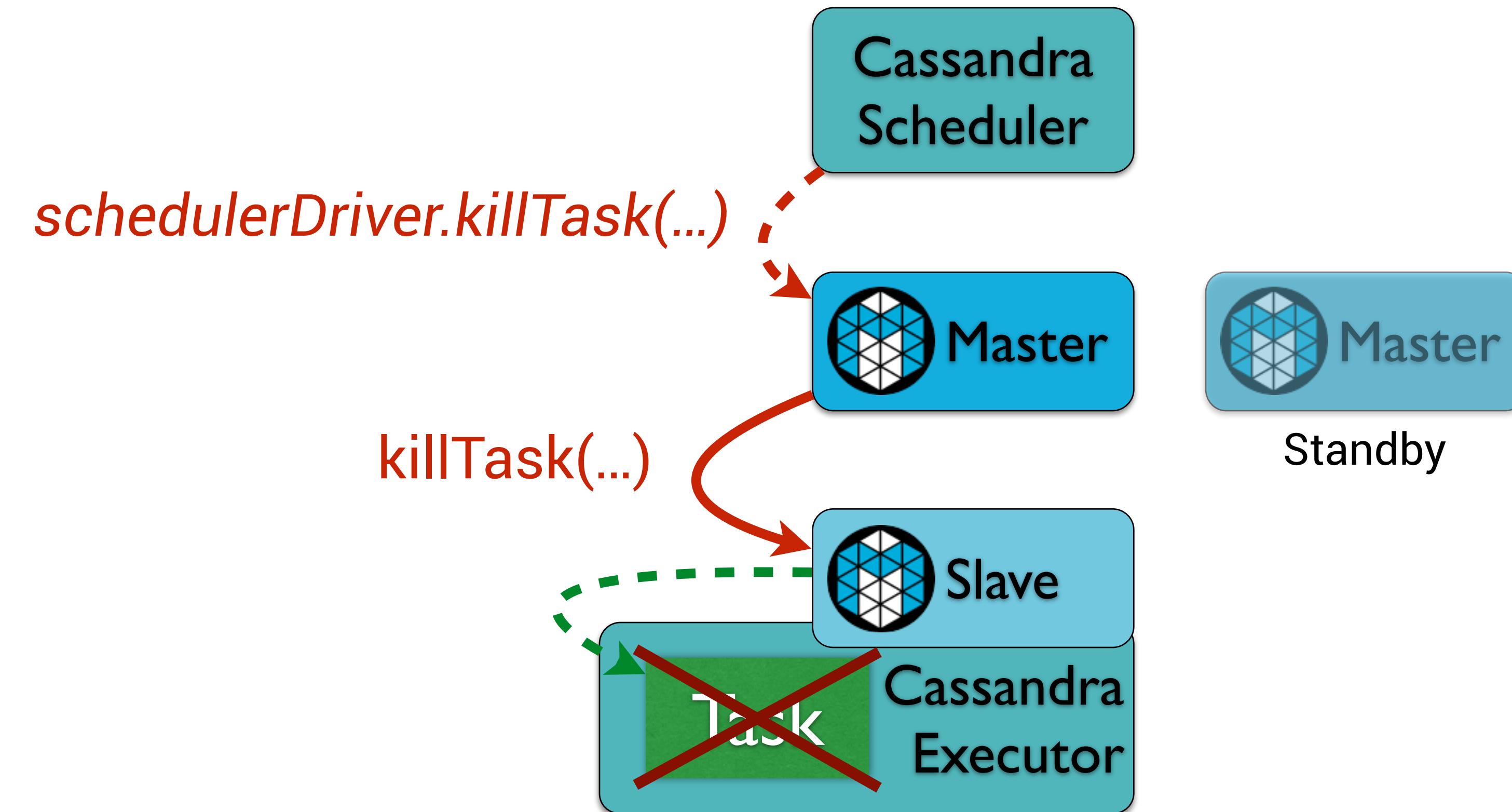
Scheduler : Task management



```
void launchTask(ExecutorDriver driver, TaskInfo taskInfo);
```



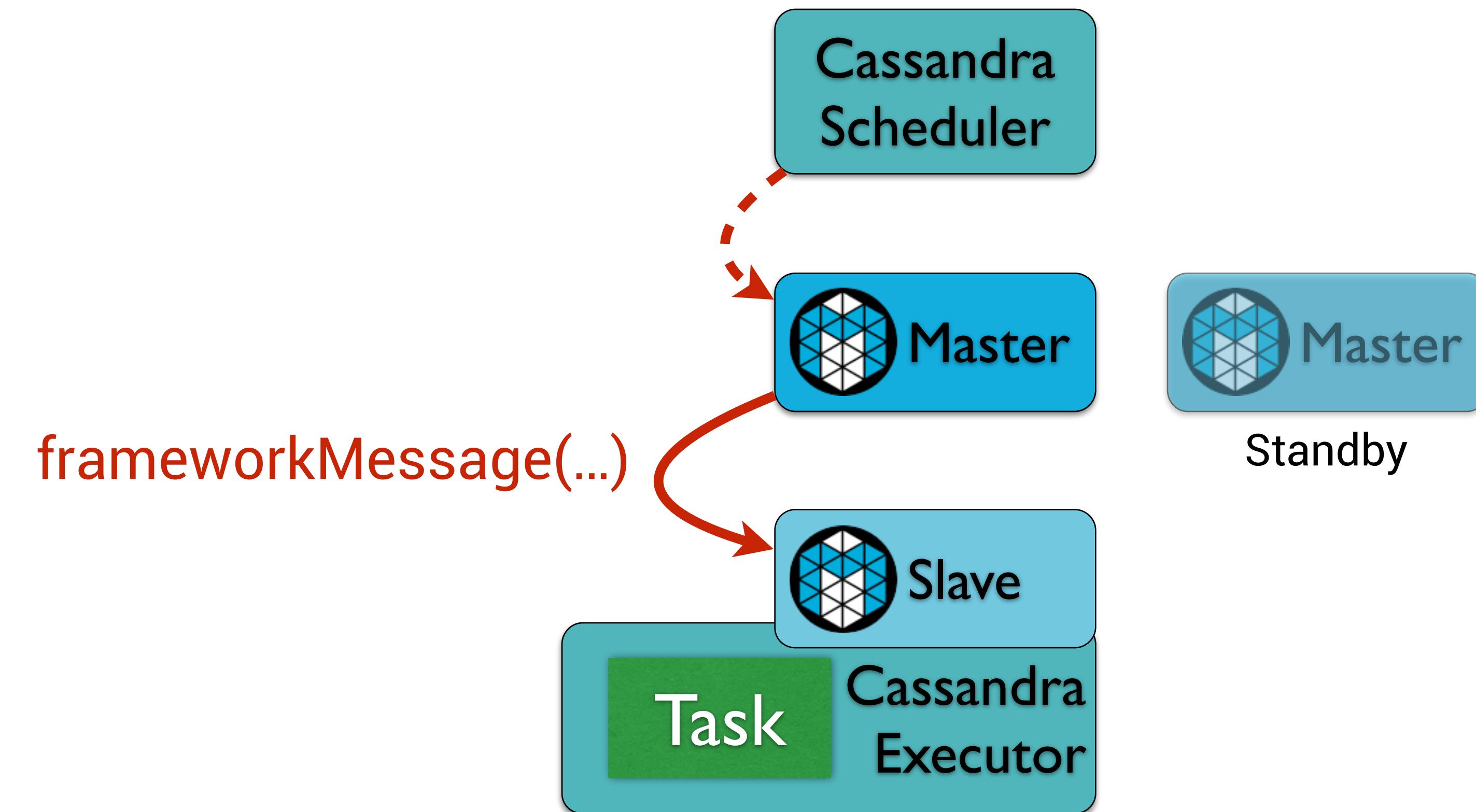
Scheduler : Task management



```
void killTask(ExecutorDriver driver, TaskID taskId);
```



Scheduler : Communication



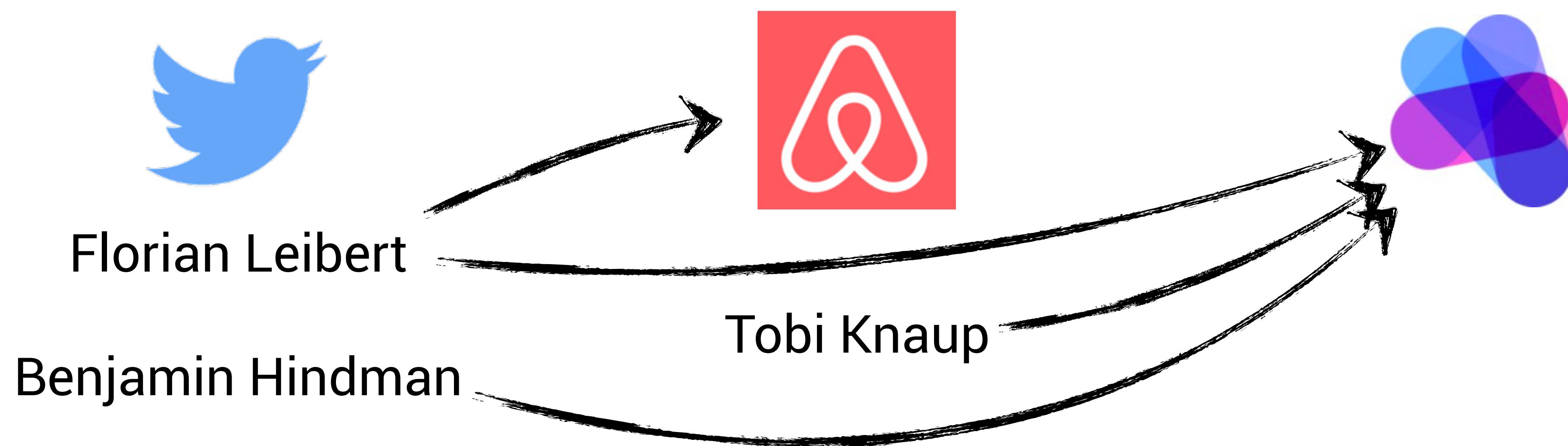
```
void frameworkMessage(ExecutorDriver driver, byte[] msg);
```



Mesosphere : Chronos & Marathon



Mesosphere





Mesosphere

We're Mesosphere

We're building an operating system for the datacenter

Our mission is to make building and running distributed systems as easy as building or running an app on your smartphone.



Chronos

The screenshot shows the Chronos web interface running on a Mac OS X system. The main page displays a list of 200 total jobs and 5 failed jobs. The list is ordered by last run, showing various job names like JOB1386722355926, JOB1386722360087, etc., each with a status indicator (success or fresh). On the right, two detailed job views are shown for JOB1386722360277 and JOB1386722360087, showing command details, owner information, and scheduling.

CHRONOS ...

TOTAL JOBS **200** FAILED JOBS **5**

Search job name or status

| NAME | LAST |
|------------------|---------|
| JOB1386722355926 | success |
| JOB1386722360087 | success |
| JOB1386722359796 | fresh |
| JOB1386722360277 | fresh |
| JOB1386722354534 | fresh |
| JOB1386722356866 | fresh |
| JOB1386722355724 | success |
| JOB1386722356664 | fresh |
| JOB1386722355529 | fresh |
| JOB1386722354663 | fresh |
| JOB1386722359489 | fresh |
| JOB1386722359459 | fresh |
| JOB1386722360379 | fresh |
| JOB1386722354851 | fresh |

NAME: JOB1386722360277
COMMAND: sleep 50
OWNER(S): rob@fake.com
SCHEDULE: R/2013-12-11T00:39:20.277836/PT24H
NO STATS AVAILABLE FOR JOB.
Other settings

NAME: JOB1386722360087
COMMAND: sleep 5
OWNER(S): rob@fake.com
SCHEDULE: R/2013-12-10T00:39:20Z/PT24H

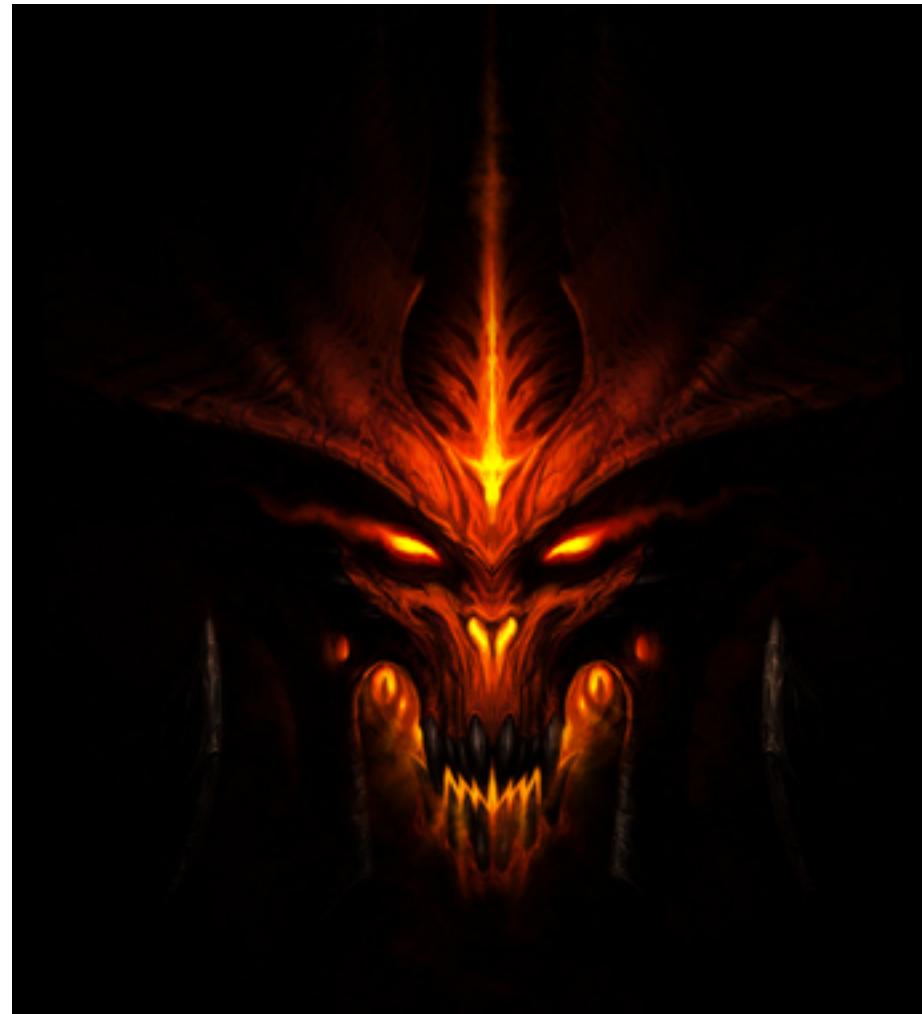


Marathon





Quoi ?



“Init Daemon” pour Data Center



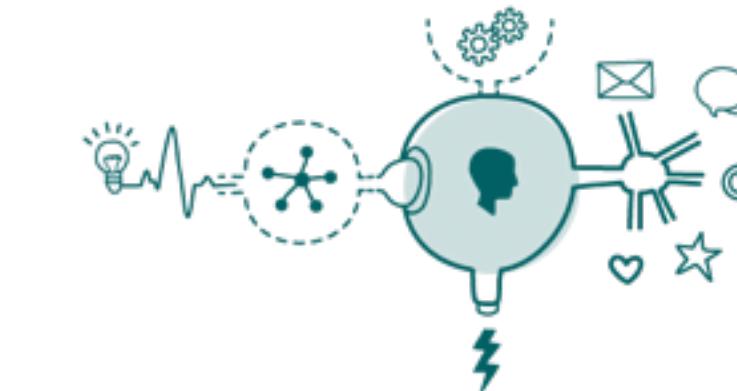
Private PaaS



Pourquoi ?



Simplifier



API pour les
développeurs



Automatiser



Améliorer l'efficacité



Fonctionnalités



Déploiement
élastique



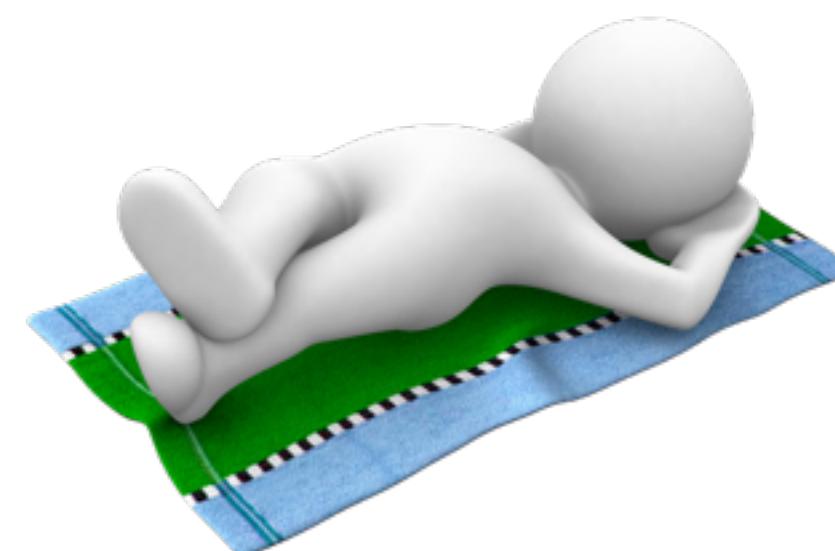
Haute
disponibilité



Service
Discovery



Sécurité



API REST



Système
d'évènements



UI : liste des applications

The screenshot shows the Marathon UI interface. At the top, there is a navigation bar with the Marathon logo, tabs for 'Apps' (which is selected), 'Deployments', 'About', and 'Docs'. Below the navigation bar is a green button labeled '+ New App'. The main area displays a table of running applications:

| ID | Memory (MB) | CPUs | Tasks / Instances | Status |
|----------------------|-------------|------|-------------------|---------|
| /elasticsearch | 512 | 0.25 | 1 / 1 | Running |
| /inboundconnector | 256 | 0.5 | 1 / 1 | Running |
| /provisioning | 512 | 2 | 1 / 1 | Running |
| /transactionindexer | 256 | 0.25 | 1 / 1 | Running |
| /transactioninjector | 256 | 0.25 | 1 / 1 | Running |

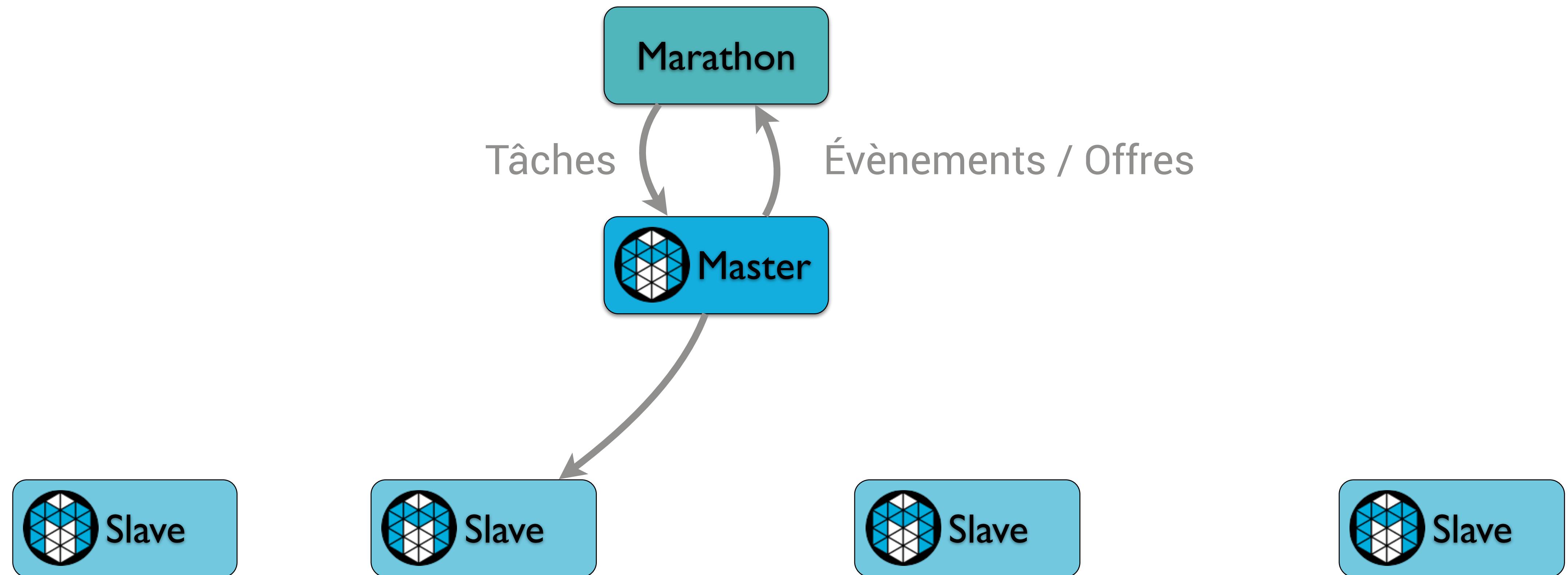


UI : créer une application

The screenshot shows the Marathon UI interface. At the top, there's a navigation bar with 'MARATHON' logo, 'Apps' (which is underlined), and 'Deployments'. Below the navigation, a sidebar on the left lists existing applications: '/elasticsearch', '/inboundconnector', '/provisioning', '/transactionindexer', and '/transactioninjector'. A green button '+ New App' is located at the bottom of this sidebar. The main area is a 'New Application' dialog box. It contains fields for 'ID' (empty), 'CPUs' (0.1), 'Memory (MB)' (16), 'Disk Space (MB)' (0), and 'Instances' (1). Below these, there's a section for 'Optional Settings' with fields for 'Command' (empty), 'Executor' (empty), 'Ports' (0), and 'URIs' (empty). A note for 'Ports' says: 'Comma-separated list of numbers. 0's (zeros) assign random ports. (Default: one random port)'. Another note for 'URIs' says: 'Comma-separated list of valid URIs.'. A note for 'Constraints' says: 'Comma-separated list of valid constraints. Valid constraint format is "field:operator[value]".' At the bottom of the dialog are two buttons: '+ Create' (green) and 'Cancel'.

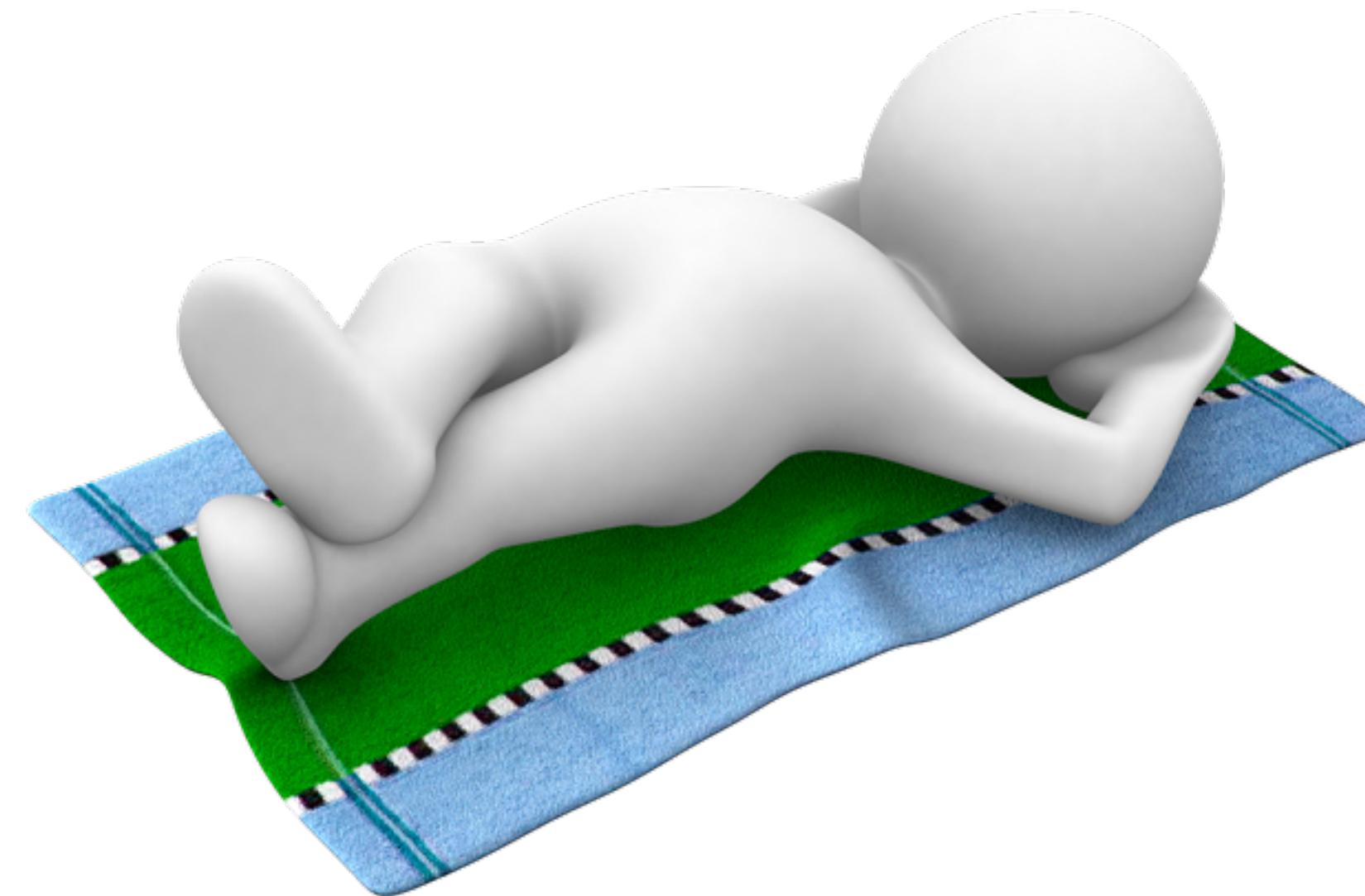


Cycle de vie





Marathon



API REST



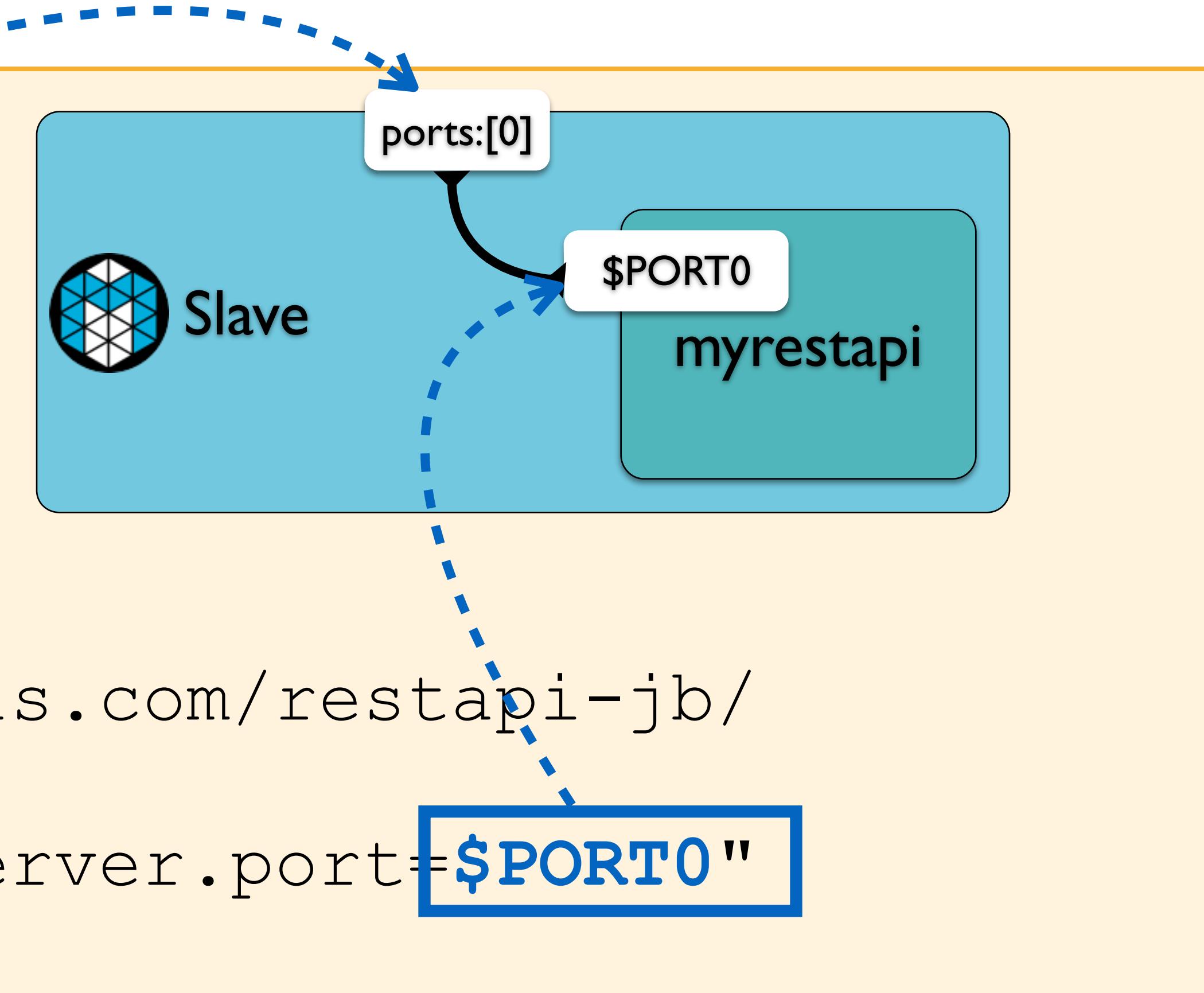
Démarrer une “Self Contained App”

```
POST /v2/apps
{
  "id": "myrestapi",
  "instances": 2,
  "cpus": 0.3,
  "mem": 128,
  "ports": [0],
  "uris": ["http://storage.googleapis.com/restapi-jb/
RestApi.jar"],
  "cmd": "java -jar RestApi.jar --server.port=$PORT0"
}
```



Démarrer une “Self Contained App”

```
POST /v2/apps
{
  "id": "myrestapi",
  "instances": 2,
  "cpus": 0.3,
  "mem": 128,
  "ports": [0],
  "uris": ["http://storage.googleapis.com/restapi-jb/
RestApi.jar"],
  "cmd": "java -jar RestApi.jar --server.port=$PORT0"
}
```





Démarrer une application Dockerisée

POST /v2/apps

```
{  
  "id": "ubuntu",  
  "container": {  
    "type": "DOCKER",  
    "docker": {  
      "image": "libmesos/ubuntu"  
    }  
  },  
  "instances": 1,  
  "cpus": 0.5,  
  "mem": 512,  
  "uris": [],  
  "cmd": "while sleep 10; do date -u +%T; done"  
}
```



Health check

- Par défaut, information provenant de Mesos

TASK_RUNNING => Healthy

- Configurable via l'API REST de Marathon



Health check

```
{  
  "id": "my-restapi-example-app",  
  ...  
  "healthChecks": [  
    {  
      "protocol": "COMMAND",  
      "command": { "value": "curl -f -X GET  
                  http://$HOST:$PORT0/simpleapi/info" },  
      "gracePeriodSeconds": 300,  
      "intervalSeconds": 5,  
      "timeoutSeconds": 3,  
      "maxConsecutiveFailures": 3  
    }  
  ]  
}
```



Health check

```
{  
  "id": "my-restapi-example-app",  
  ...  
  "healthChecks": [  
    {  
      "protocol": "HTTP",  
      "path": "/simpleapi/info",  
      "gracePeriodSeconds": 300,  
      "intervalSeconds": 5,  
      "timeoutSeconds": 3,  
      "maxConsecutiveFailures": 3  
    }  
  ]  
}
```



Les contraintes

**Contrôler le “où” lors
du déploiement**





Les contraintes : tags

Identifier les ressources par des tags :

- type de hardware
- emplacement physique (datacenter , rack)
- ...

Positionnées au démarrage du slave

```
$ mesos-slave ... --attributes="rack_id:2"
```



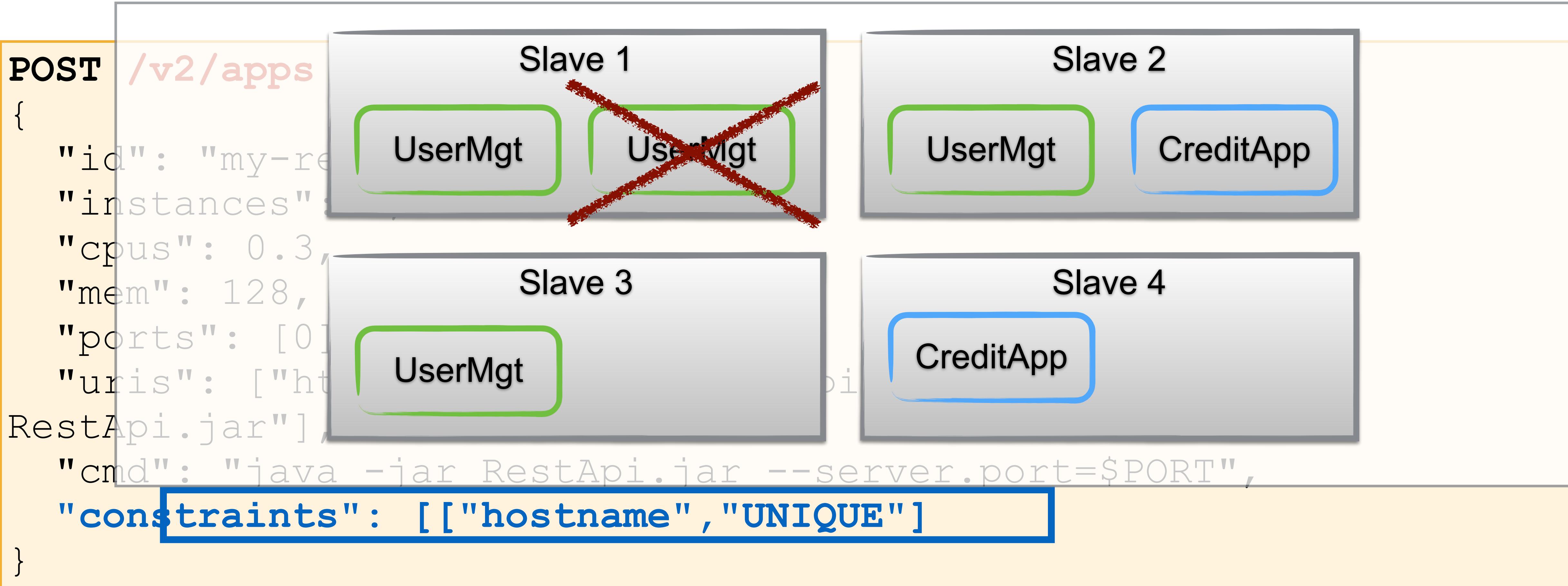


Contrainte : *UNIQUE*

```
POST /v2/apps
{
  "id": "my-restapi-example-app",
  "instances": 2,
  "cpus": 0.3,
  "mem": 128,
  "ports": [0],
  "uris": ["http://storage.googleapis.com/restapi-jb/
RestApi.jar"],
  "cmd": "java -jar RestApi.jar --server.port=$PORT",
  "constraints": [["hostname", "UNIQUE"]]
}
```

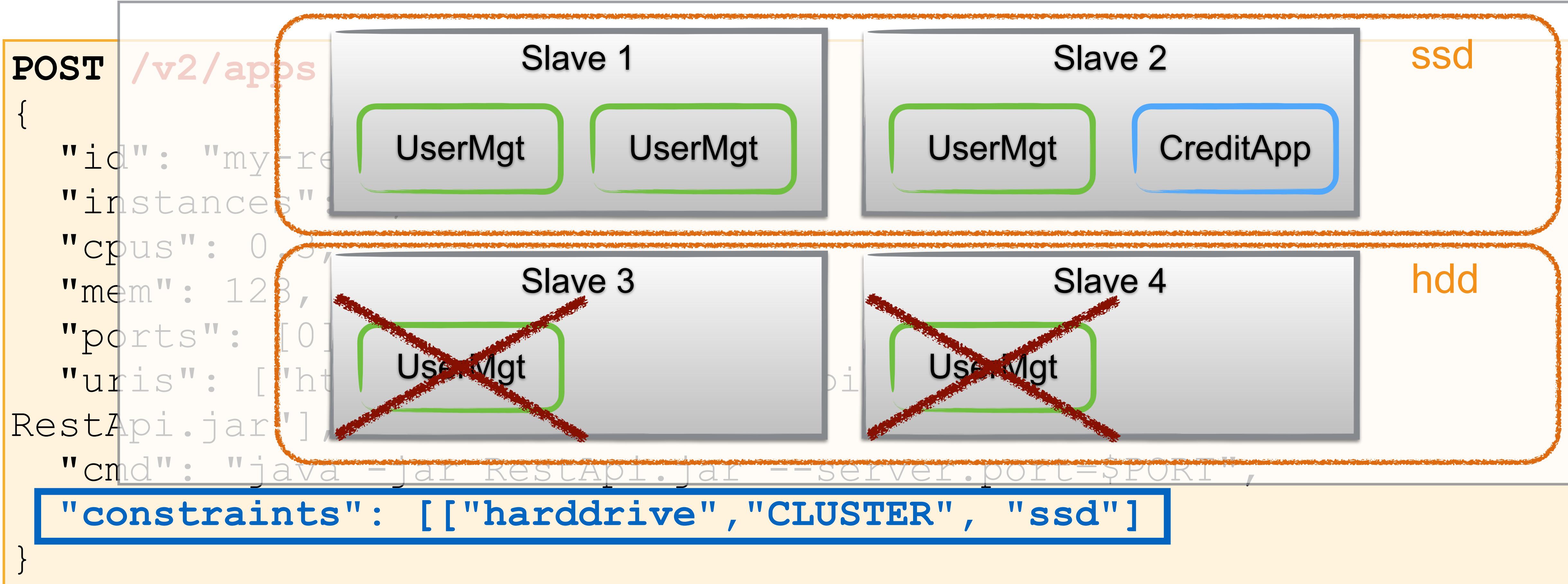


Contrainte : *UNIQUE*





Contrainte : CLUSTER





Contrainte : CLUSTER

POST

/v2/apps

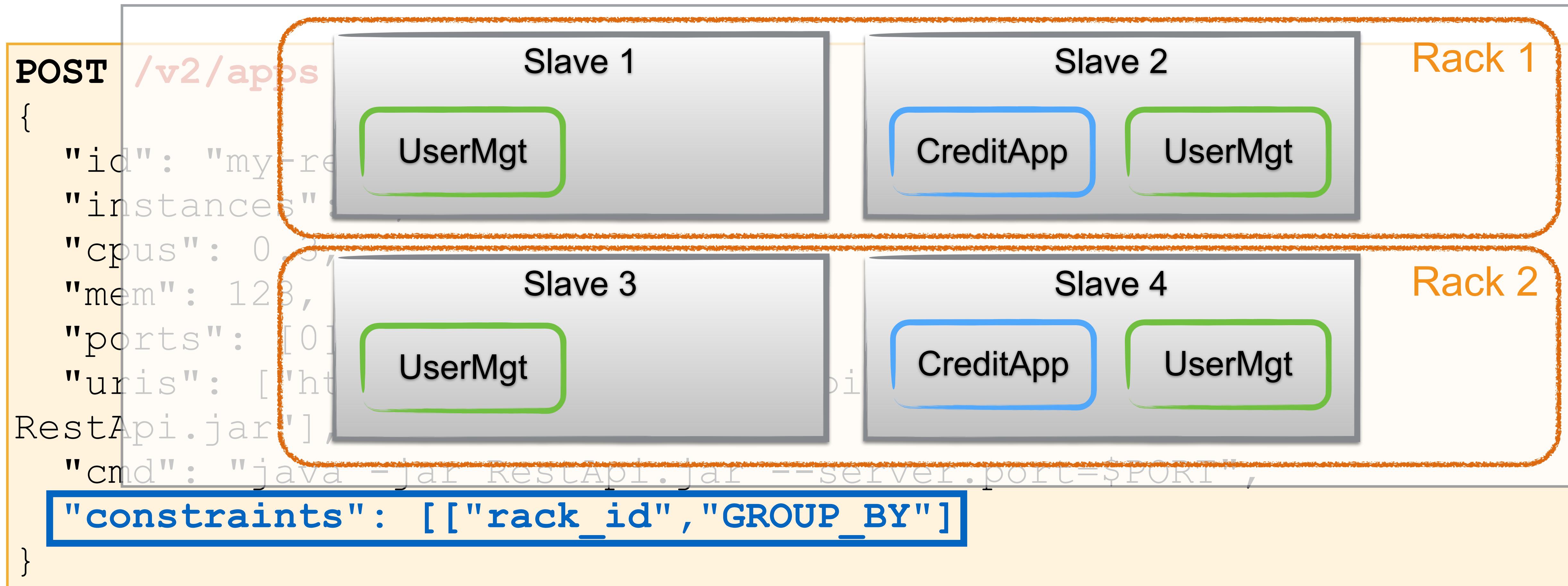
{

```
"id": "my-re  
"instances": 1,  
"cpus": 0.3,  
"mem": 128,  
"ports": [0],  
"uris": ["ht  
RestApi.jar"],  
"cmd": "java -jar RestApi.jar --server.port=$PORT",  
"constraints": [ ["hostname", "CLUSTER", "slave-3"] ]  
}
```





Constraint : GROUP_BY





Contrainte : *UNLIKE*

POST

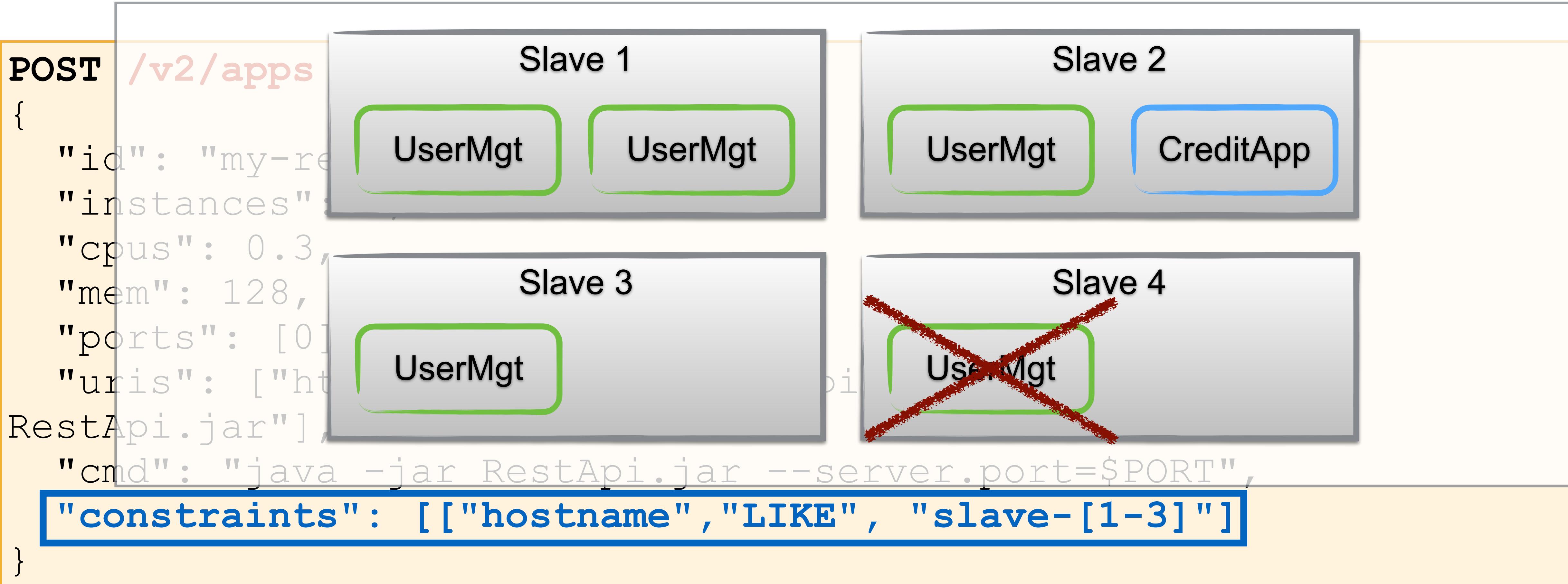
/v2/apps

```
{  
  "id": "my-re",  
  "instances": 2,  
  "cpus": 0.3,  
  "mem": 128,  
  "ports": [0],  
  "uris": ["ht  
RestApi.jar"],  
  "cmd": "java -jar RestApi.jar --server.port=$PORT",  
  "constraints": [[{"hostname": "UNLIKE", "slave": "slave-[2-3]"}]  
}
```





Contrainte : *LIKE*





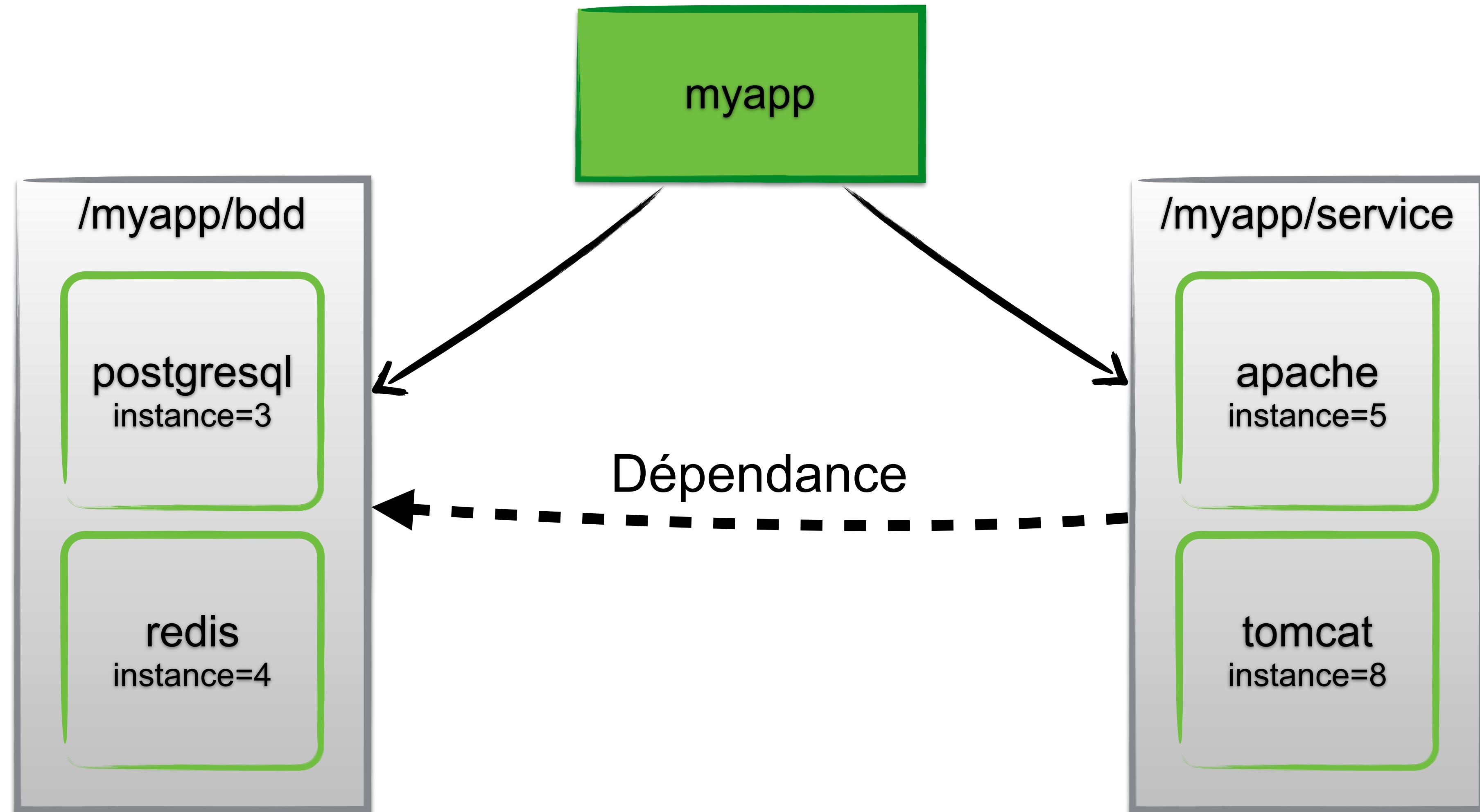
Application groups

- Définir des liens de dépendance entre les groupes
- Scaler tout un groupe à la fois





Marathon : Application groups





Application groups

```
{  
  "id": "/myapp",  
  "groups": [  
    {  
      "id": "/myapp/bdd",  
      "apps": [  
        { "id": "/myapp/postgresql", ... },  
        { "id": "/myapp/redis", ... }  
      ]  
    },  
    {  
      "id": "/myapp/service",  
      "dependencies": ["/myapp/bdd"],  
      "apps": [  
        { "id": "/myapp/apache", ... },  
        { "id": "/myapp/tomcat", ... }  
      ]  
    }  
  ]  
}
```



Service Discovery

Où est mon application ?





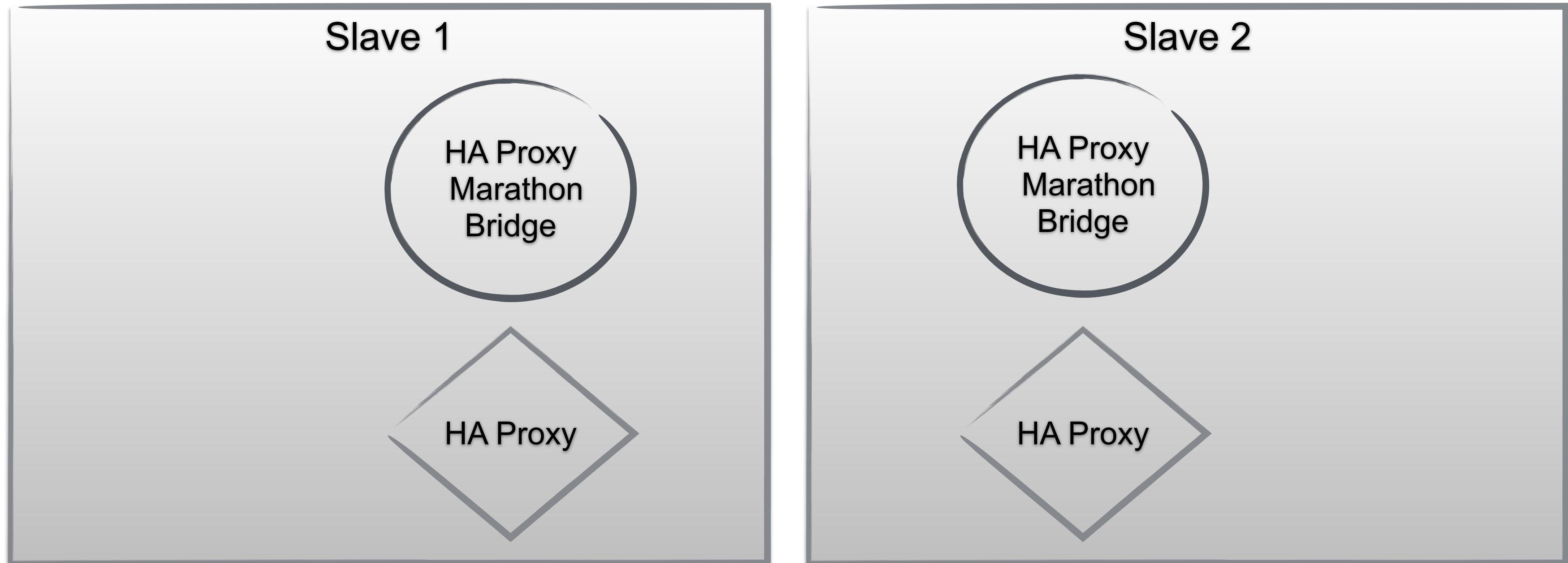
HaProxy : reload configuration



- HaProxy - Marathon bridge (script)
- Bamboo



Service Discovery

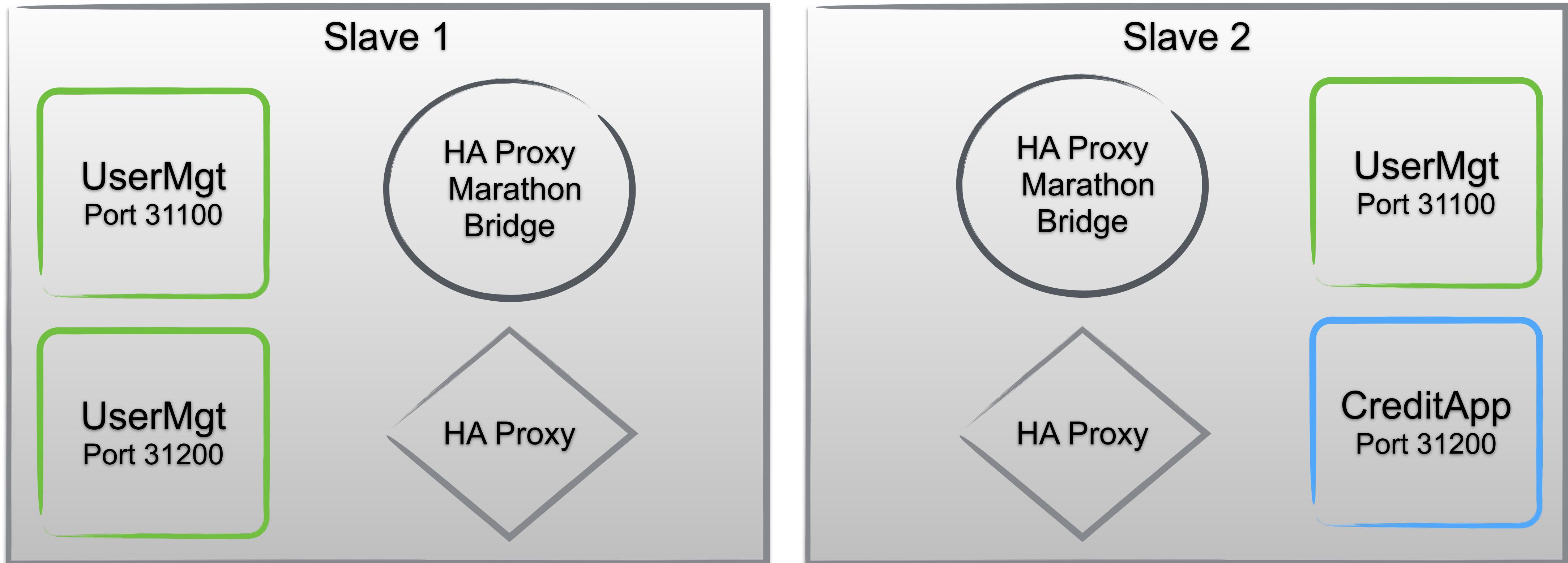




Service Discovery



UserMgt Port : 10000
CreditApp Port : 20000

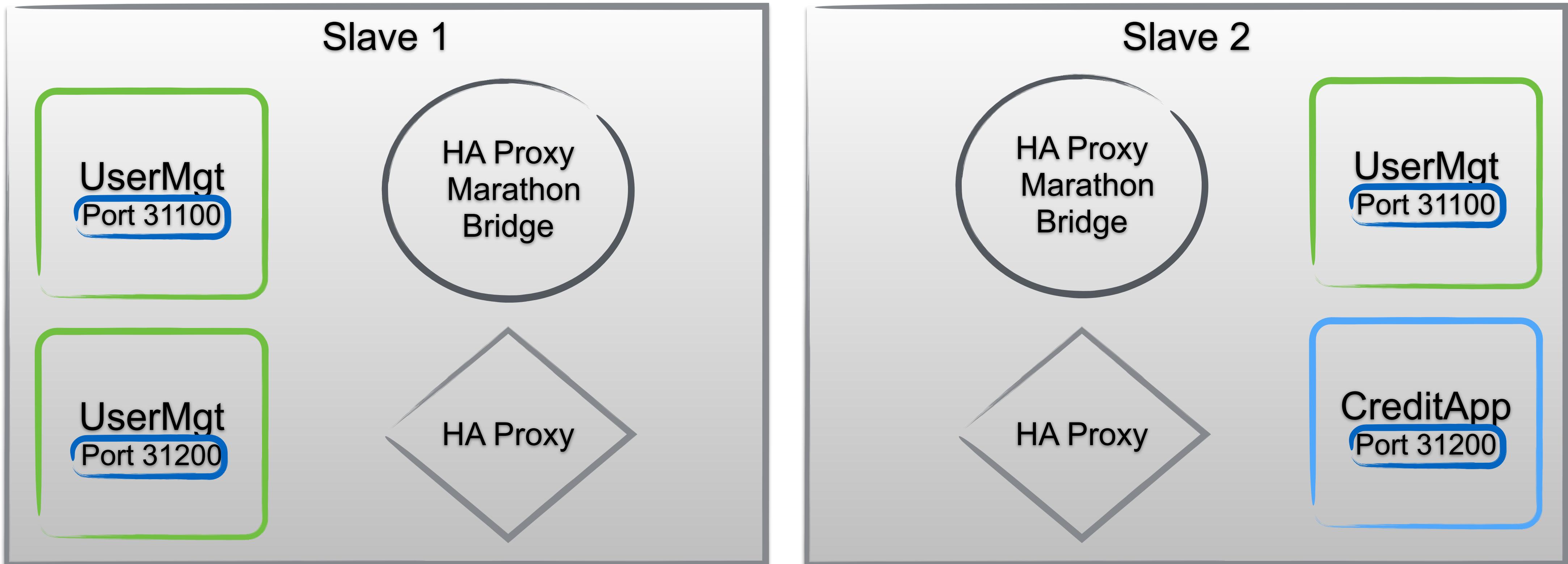




Service Discovery

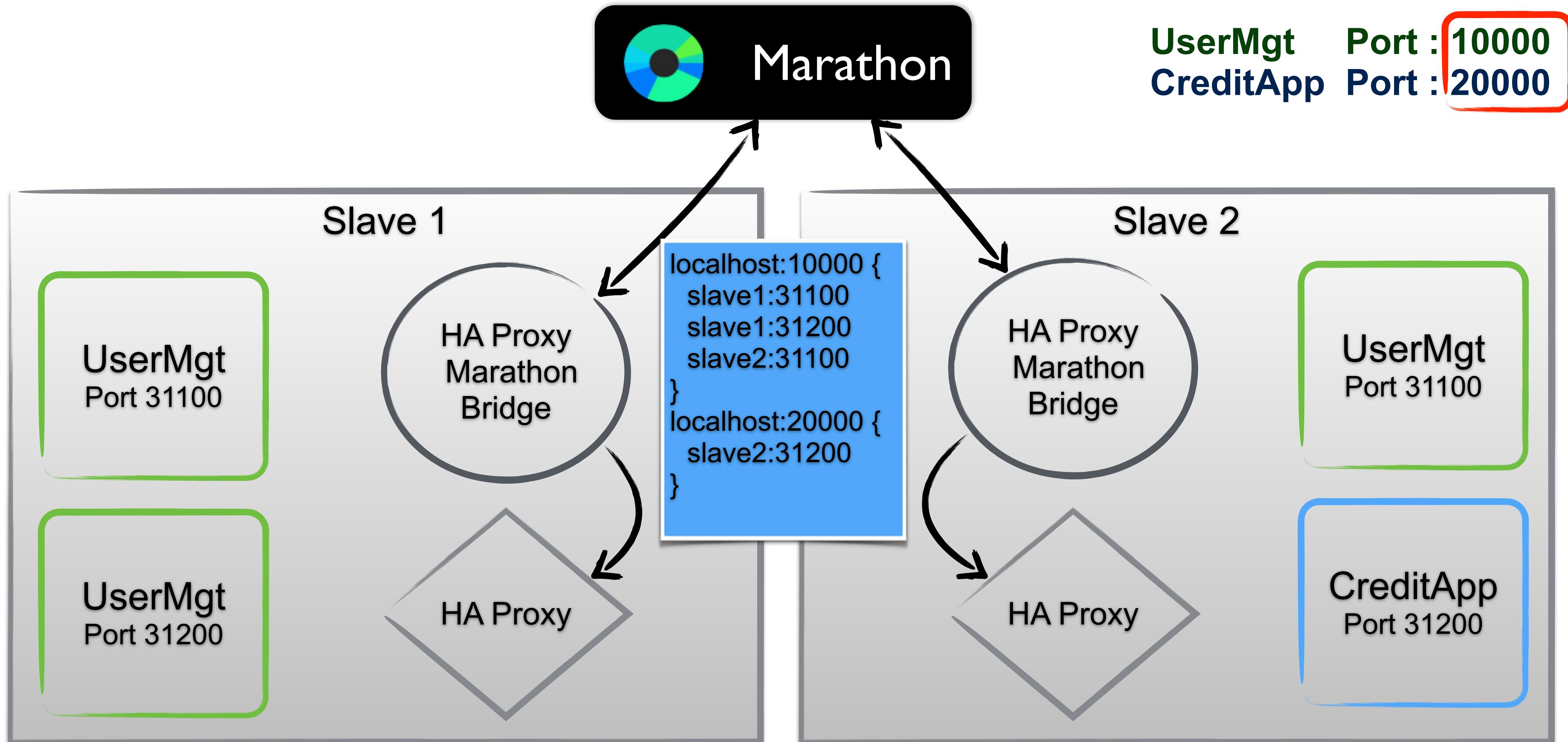


UserMgt Port : 10000
CreditApp Port : 20000





Service Discovery

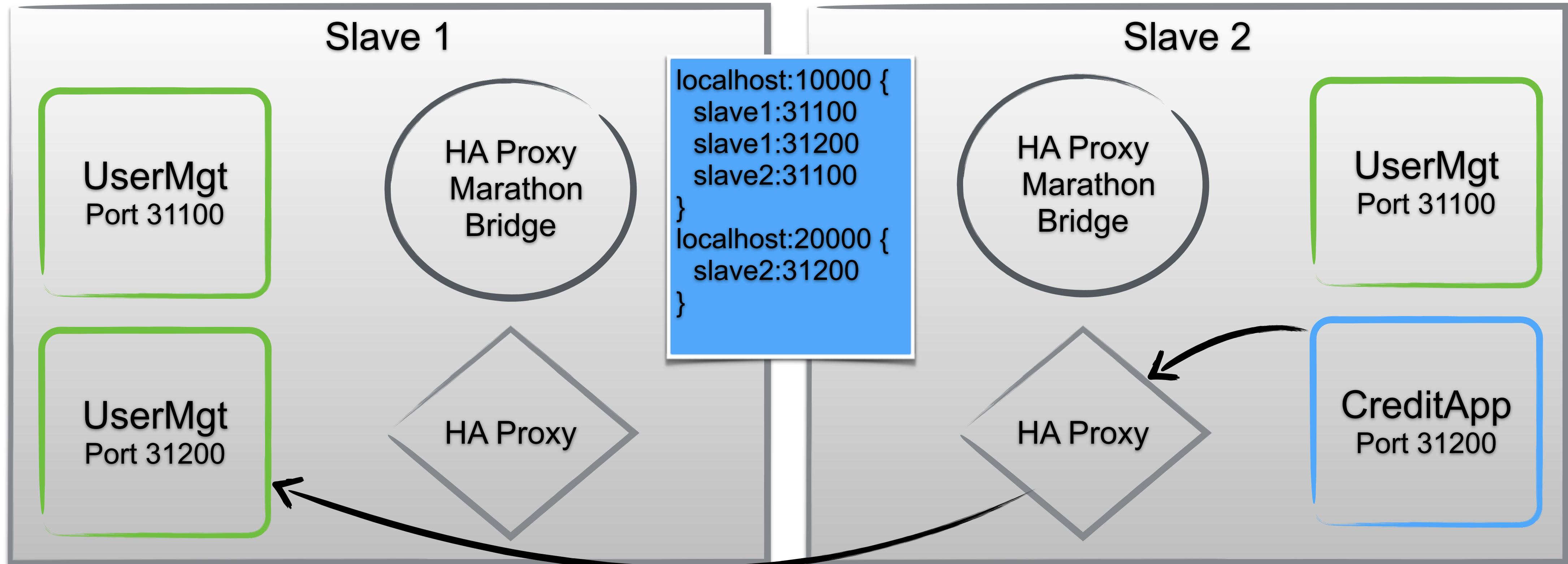




Service Discovery

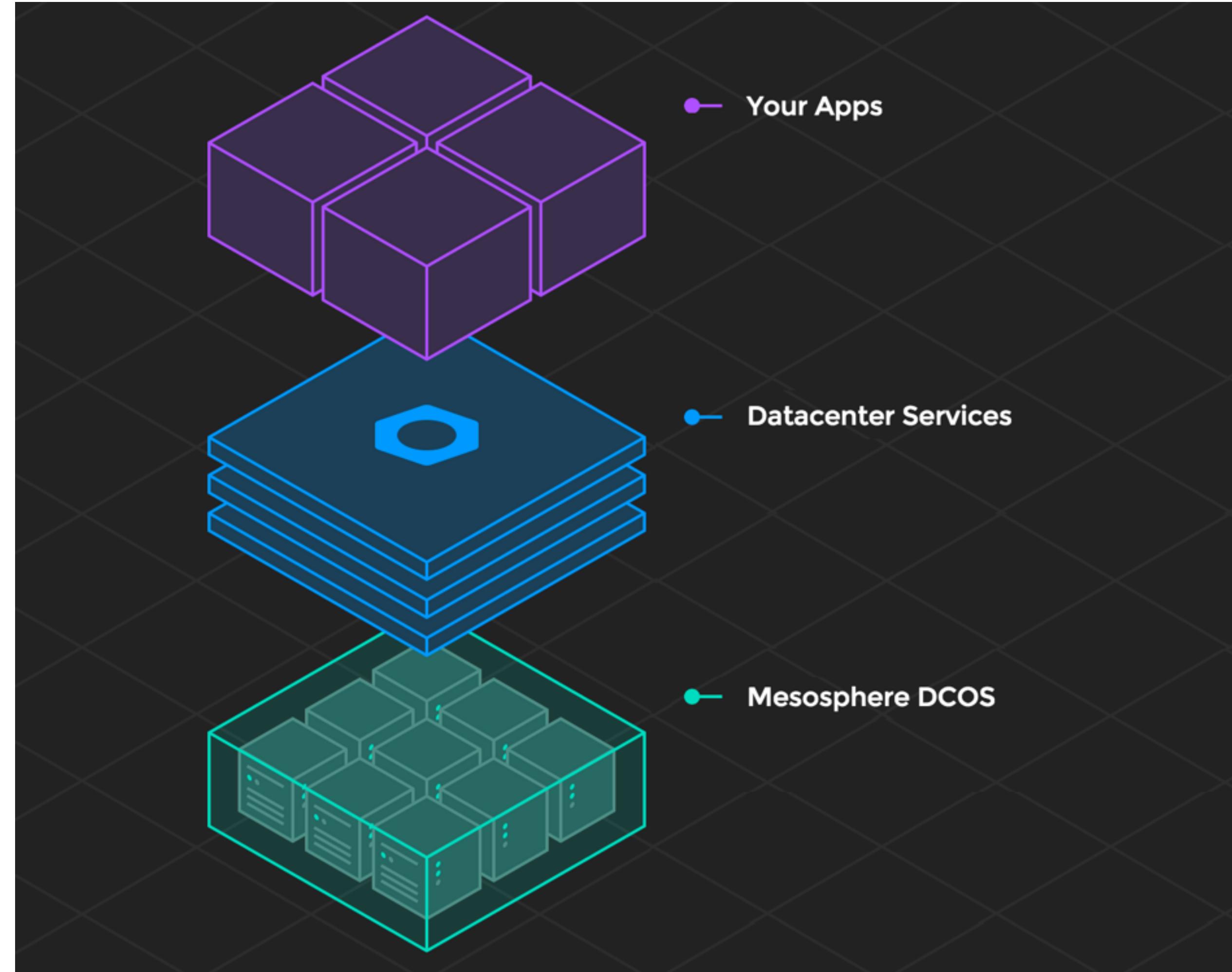


UserMgt Port : 10000
CreditApp Port : 20000





DCOS





Demo



Q & A
