

Dependency check vs. Readiness check

Design Document

Version 1.0
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1 Overview

This document describes the enhancement to manage service dependencies between YARN applications and remote services. This is useful to improve efficiency in automating complex service infrastructures.

1.1 Requirement Description

Complex enterprise data warehouse may be composed of multiple services and applications. Automation of operating services and application are important factor to guarantee business operation with minimal down time. One of the requirement for improve automation is to have ability to predefine dependencies for each service module to assist automated application master to make decision when to launch applications or upgrade service components.

1.2 Solution Summary

In YARN service specification file, user will have ability to define service dependency or component dependency. Service dependency check will verify the upstream service is operational before the downstream service is launched. Component dependency check will verify a particular hostname and port is active before the downstream service is launched.

Express upgrade will automatically resolve dependencies and upgrade service components according to the order of defined dependencies.

2 External

2.1 Target User

This feature is target for service developer to express service and component dependencies.

2.2 Usage

During the deployment of YARN service, developer predefined dependencies.

2.2.1 Service Dependency

The service spec will add the dependency tag to the top level of the JSON.

```
{
  "name": "my-hive",
  "remote-service-dependency": [ "my-hdfs", "my-yarn" ],
  ..
}
```

2.2.2 Component Dependency

The service spec will add the component dependency tag to the top level of the JSON.

```
{
  "Remote-component-dependency": [
    {
      "type": "HTTP",
      "properties": {
        "url": "http://example.com:8080"
      }
    },
    {
      "type": "PORT",
      "properties": {
        "host": "127.0.0.1",
        "port": "8080"
      }
    }
  ]
}
```

3 Internal

This change will be proposed to be merged in Apache Hadoop 3.2.x release.

3.1 Design

3.1.1 YARN-8733 Readiness check for remote component

The service check will run as part of YARN serviceAM. The application master will be launched then process the remote-component-dependency list. ServiceAM must have direct network route to the specified host and port to perform the check. The entire flow is shown in figure 1.

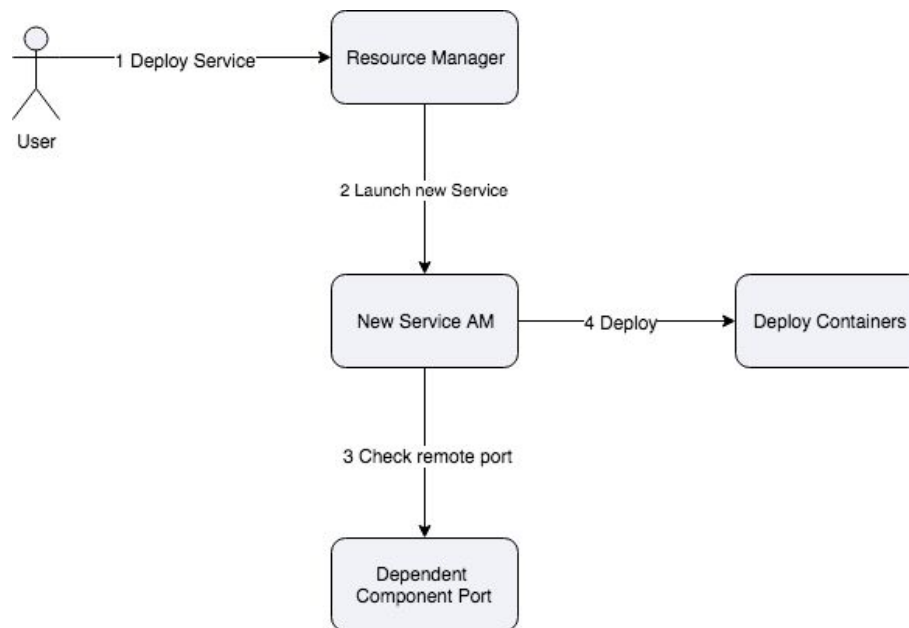


Figure 1

1. User trigger new service to deploy by using YARN CLI to submit service.
2. Resource Manager launches the new service.
3. Service application master check remote-component-dependency port
4. If remote port is running, start containers.

3.1.2 YARN-8734 Readiness check for remote service

The service check will run as part of ServiceClient in Resource Manager REST API. If the dependent service state is stable, then the newly launched service will be allowed. The entire flow is shown in figure 2.

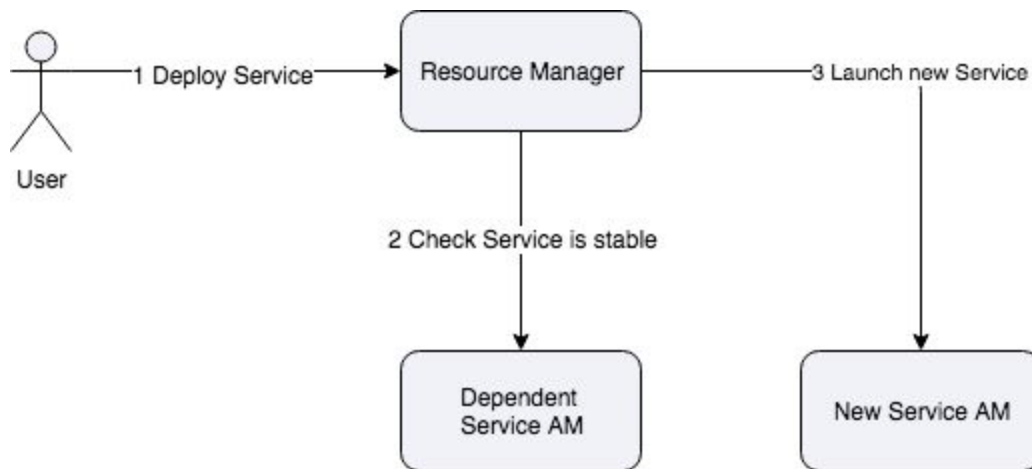


Figure 2

1. User trigger new service to deploy by using YARN CLI to submit service.
2. Resource Manager check with remote service application master for stable state.
3. If the dependent service is stable, allow the new service to launch.
4. New service AM may verify with dependent service again to start container deployment.

4 Known Issues

4.1 Circular dependencies

Service dependencies are checked before deployment of YARN service. The service will not be allowed to deploy, if the dependent software does not exist. This strategy prevents multiple service being deployed and depend on each other.

Component dependency is less restricted because there is no awareness if the service is running beside the liveness of the service port. This means user must use this feature with care to prevent circular dependencies from occurring.

4.2 Dependency of service deployed by another user

YARN service can only refer to other services deployed by the same user. This is a limitation imposed by forward porting of slider code base. This limitation will be lifted in future release of Hadoop. Before this limitation is lifted, service can only use component dependency to check service deployed by another user.