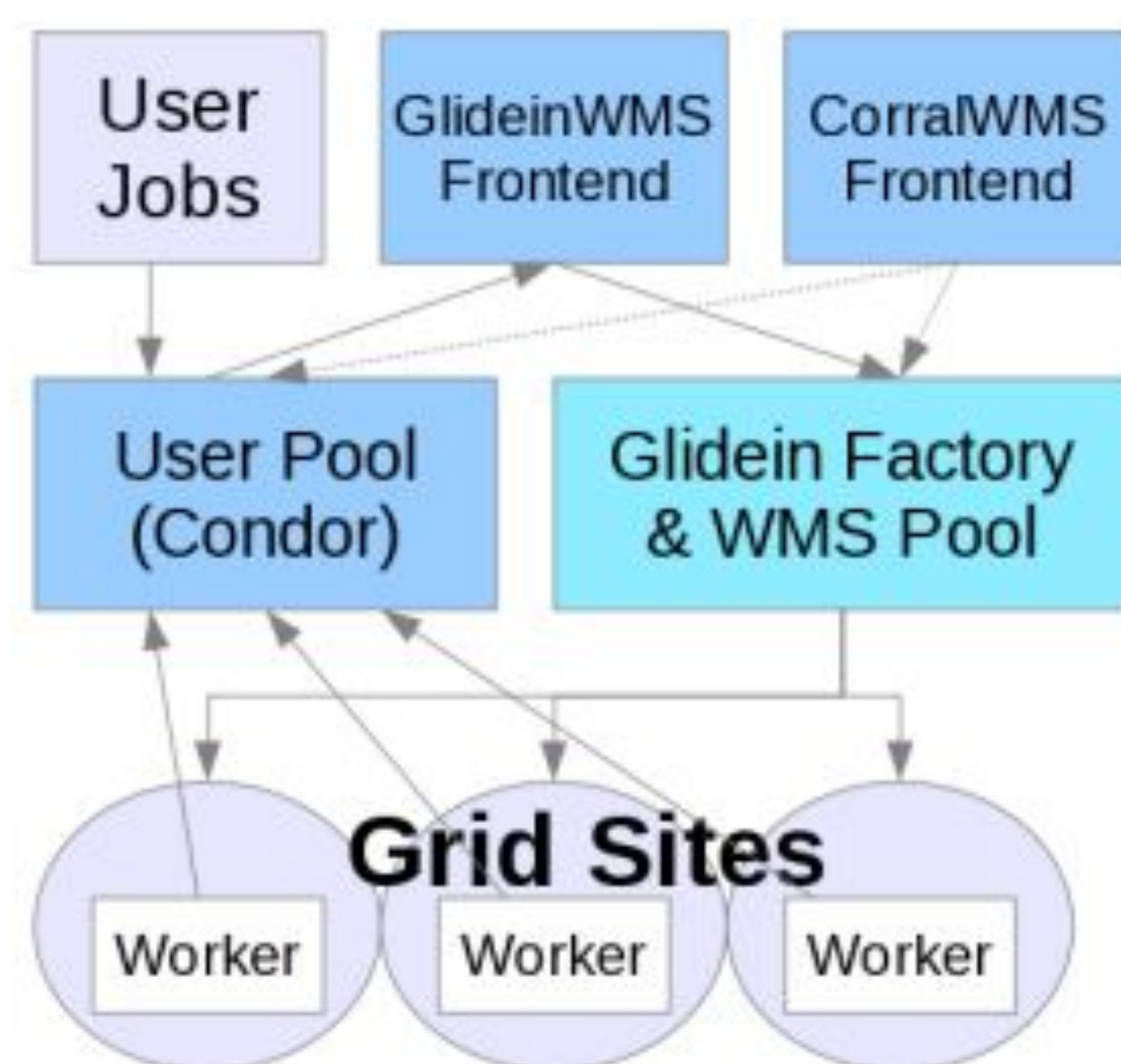


Containerization and IPv6 for GlideinWMS

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Introduction

- Glidein Workflow Management System: used to submit jobs to grid computing nodes, consists of several distinct components that must communicate securely
- Glideins: wrappers around user jobs to provide additional features
- IPv6: newer method of network addressing that will (hopefully) become more common in the future
- Containers: method of bundling software in a virtual operating system to provide a consistent deployment environment



Overview of the GlideinWMS architecture

Purpose

- Test compatibility of the GWMS stack with IPv6
 - DOE requires all new systems IPv6-equipped by FY 2023
- Motivation for containers:
 - Quickly deploy the system to test different environments
 - Provide easier installation for end-users

Methods

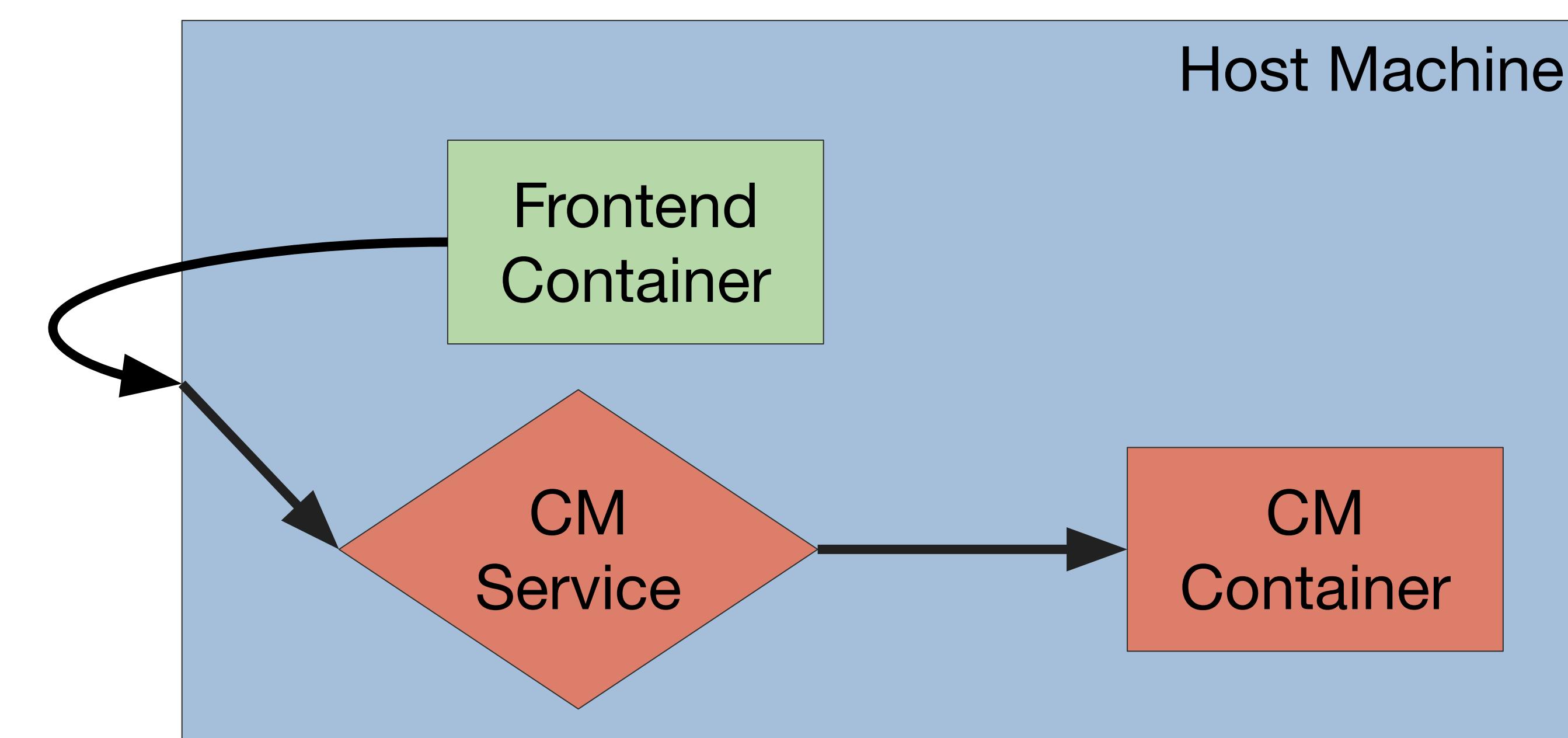
- Used Kubernetes to build a cluster of containers for several components of the GWMS stack
- Automated much of the credentials creation and sharing with a shell script
- Used Helm to make templates for the container manifests and concisely expose a few configuration options
- Deployed all components to IPv6-equipped machines and submitted jobs to test the whole system

```
# Default values for gwms.
# This is a YAML-formatted file.
# Declare variables to be passed into your templates.

hostHostname:
hostIP:

# must be relative paths
condorConfigMountRoot: config/condor
frontendConfigMountRoot: config/frontend
frontendCertsMountRoot: config/frontend/certs
```

Snippet from the values.yaml configuration file for the GWMS Helm chart



Overview of the networking architecture of the Kubernetes cluster

Conclusions

- Networking is handled by HTCondor, which supports IPv6 by default.
- However, care should be taken to ensure the Kubernetes environment does not cause issues. This means Kubernetes services should be configured to support exactly the protocols supported by the host machine.
- The GWMS Frontend and Condor central pool can be easily installed as containers.
- Further work is needed to ensure adequate configuration options are exposed and to containerize the other components of the GWMS stack.

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