



CCME
Cloud Cluster Made Easy

Service Definition Document

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Introduction

Moving to the cloud isn't like building your next HPC cluster on-premises... or is it? **CCME** (Cloud Cluster Made Easy) is a **solution that composes AWS services** to transparently build **customizable HPC clusters** in just a few minutes.

Each workload is unique. CCME allows you **to simply create multiple cluster** profiles that will match your workloads' needs: adapt the type and number of compute resources, provision a high-performance network and file system, automatically scale in and out to follow demands...

CCME provides fully featured HPC clusters in the AWS Cloud and helps you track and control your costs.

Product Description

Overview

From the user's standpoint, CCME provides access to HPC clusters tailored to match the workloads' needs. From the administrator's standpoint, CCME is the solution that allows to build HPC clusters in AWS, configure as many clusters profiles as required by the use cases, deploy as many clusters at a time as needed and manage their lifecycles.

The present service definition introduces CCME Core, which is the elementary building block required to deploy CCME in a constraint-less AWS account.

Key Benefits

- **Simplicity:** Make your HPC clusters deployment reproducible, easier and faster on AWS.
- **Fully featured HPC clusters:** Enable the creation of highly customized Cloud HPC clusters which "look like yours" on-premises HPC clusters.
- **Elasticity:** Cluster size grows and shrinks according to jobs' requirements
- **Performance:** Take benefit of all CPU architectures, types and sizes to match specific jobs technical requirements.
- **Ease-of-use:** Provide users with a web-based access to the HPC cluster through **EF Portal**, enabling the capability to manage easily data and jobs.
- **Built-in VDI:** Provide users with Linux-based and windows-based remote workstations using **DCV** for interactive pre- and post-processing tasks.
- **Costs Control: OKA Cloud** provides team leaders and managers with capabilities to understand cluster usage, build usage reports and manage easily charge-back across teams.

Core Features

- **Adaptability:** Scale computing resources according to jobs' needs.
- **Accessibility:** Access anywhere through User web interface and remote visualization.
- **User Access:** Users can connect to the cluster through a web UI or with SSH
- **Service Publication:** Publish services embedding complex applications into job submission web forms.
- **Role-based storage spaces:** Integrate various data storage technologies for performance, complex access patterns, backups and archiving.
- **Security:** Apply least privilege principle for all AWS resources.
- **Cost Control:** Monitor resources and track costs.
- **Multiplicity:** Manage multiple cluster profiles.

Architecture and Components

CCME Core consists of:

- **Cluster layer:** Made of
 - One Head Node hosting the job scheduler Slurm and the web UI through EF Portal
 - Computing Nodes
 - Connections/Mountpoints to all storage spaces
 - Optional Linux and/or Windows VDI Fleets
 - Optional Login Nodes for SSH access
- **Management Layer:** a CloudFormation stack deploys the foundational components in charge of supporting the cluster layer, including a management host which hosts the clusters configuration profiles and the lifecycle management command-line interface.
- **Security Layer:** a CloudFormation stack deploys policies and roles tailored to allow to any CCME resources the required permissions, respectfully of the least privilege principle.

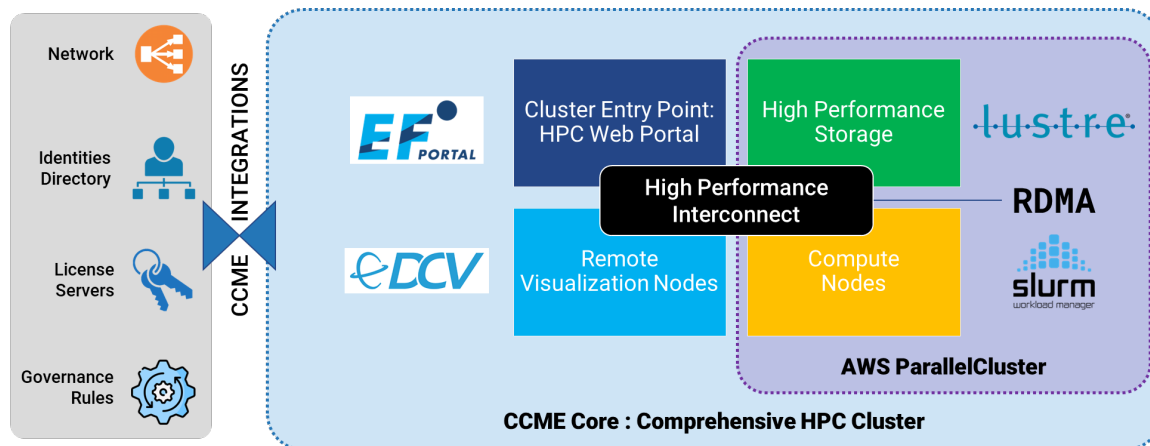
Use Cases

- **Engineering Simulations:** Run CAE and CFD applications remotely.
- **Data Science:** Execute IA and data analytics pipelines efficiently.
- **Cloud Bursting:** Extend on-premises HPC capacity with cloud resources.
- **HPC Batch Jobs:** Submit and monitor computational workloads.
- **Remote Visualization:** Access 2D/3D applications without local GPU hardware.

Extensions/Additional integrations

Examples of frequently found extensions (not included in CCME Core):

- Take into account your specific IT security requirements (restricted network communications through firewalls, SCP, etc.)
- Integrate with your User Directory or external authentication tools (including MFA, SSO)
- Build-up your specific system images
- Implement Use Case-driven customizations in EF Portal or OKA Cloud
- Integrate your business applications (including the related licenses management, if applicable)
- Create your specific documentation



Security and Compliance

CCME adheres to OWASP Top10 guidelines and DevSecOps methodology. It supports multi-factor authentication (MFA), single sign-on (SSO), and role-based access control. All communications are encrypted using TLS, and secure file transfer protocols (SSH, HTTPS) are implemented to protect sensitive data.

Pricing and Licensing

CCME Core offers a simple licensing model:

- Annual subscription: 40k£
- CCME Core deployment: 40k£

Extended integration services can be added for £1500/day.

Documentation

CCME documentation is available online here: <https://ccme.doc.ucit.fr/index.html>

Technical Support is available through UCit helpdesk here: <https://helpdesk.ucit.fr/>