C2C: An Automated Deployment Framework for Distributed Applications on Multi-Clouds

Flora Karniavoura, Antonis Papaioannou and Kostas Magoutis

Institute of Computer Science (ICS)
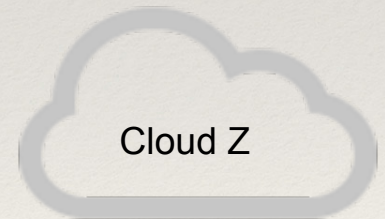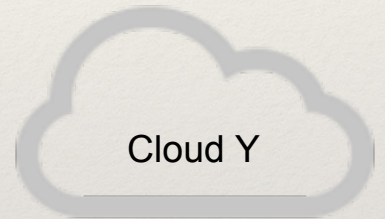
Foundation for Research and Technology Hellas (FORTH)

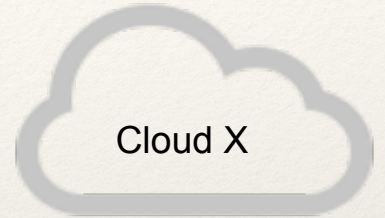# Introduction

❖ Distributed cloud-based applications

    ❖ Comprise of multiple components

    ❖ Operate on one or more cloud platforms

❖ Application modeling languages

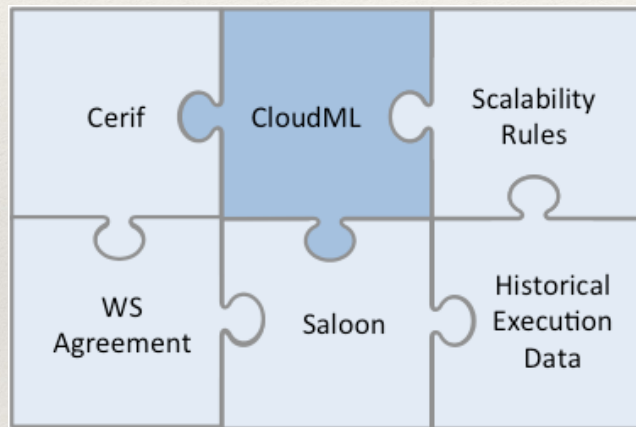   ❖ Abstract application structure

    ❖ Allow for portability

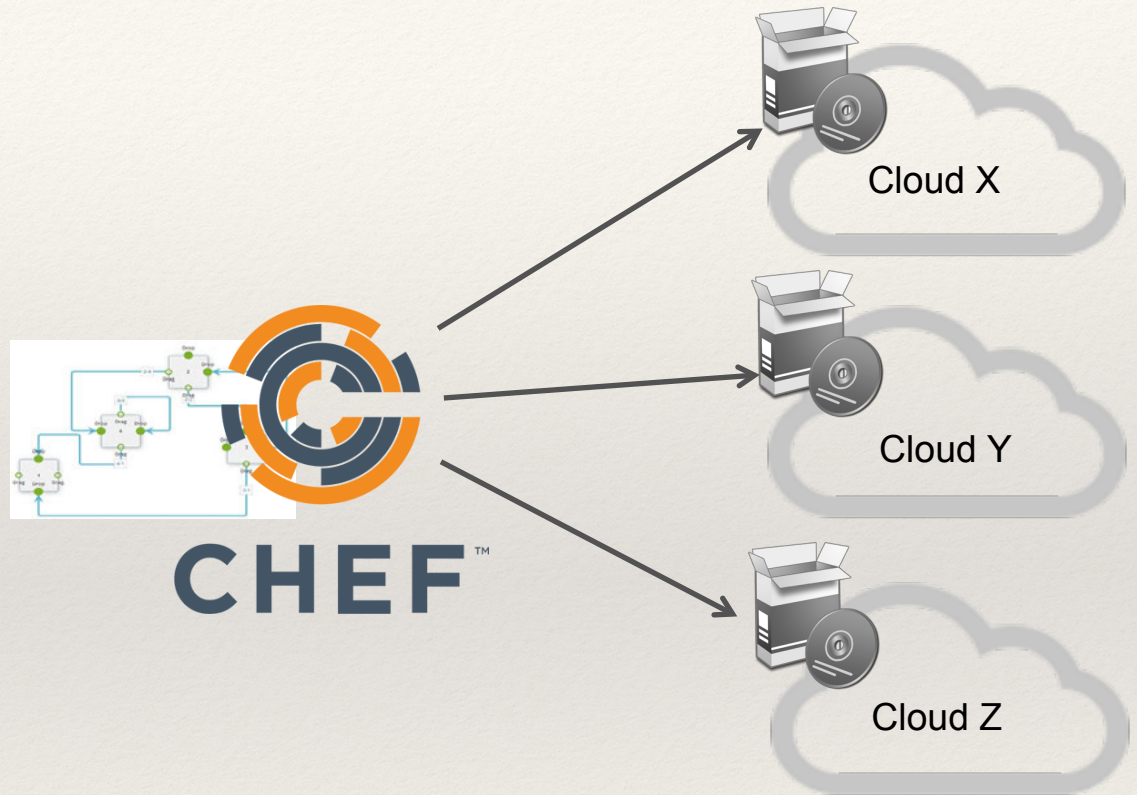# Motivation
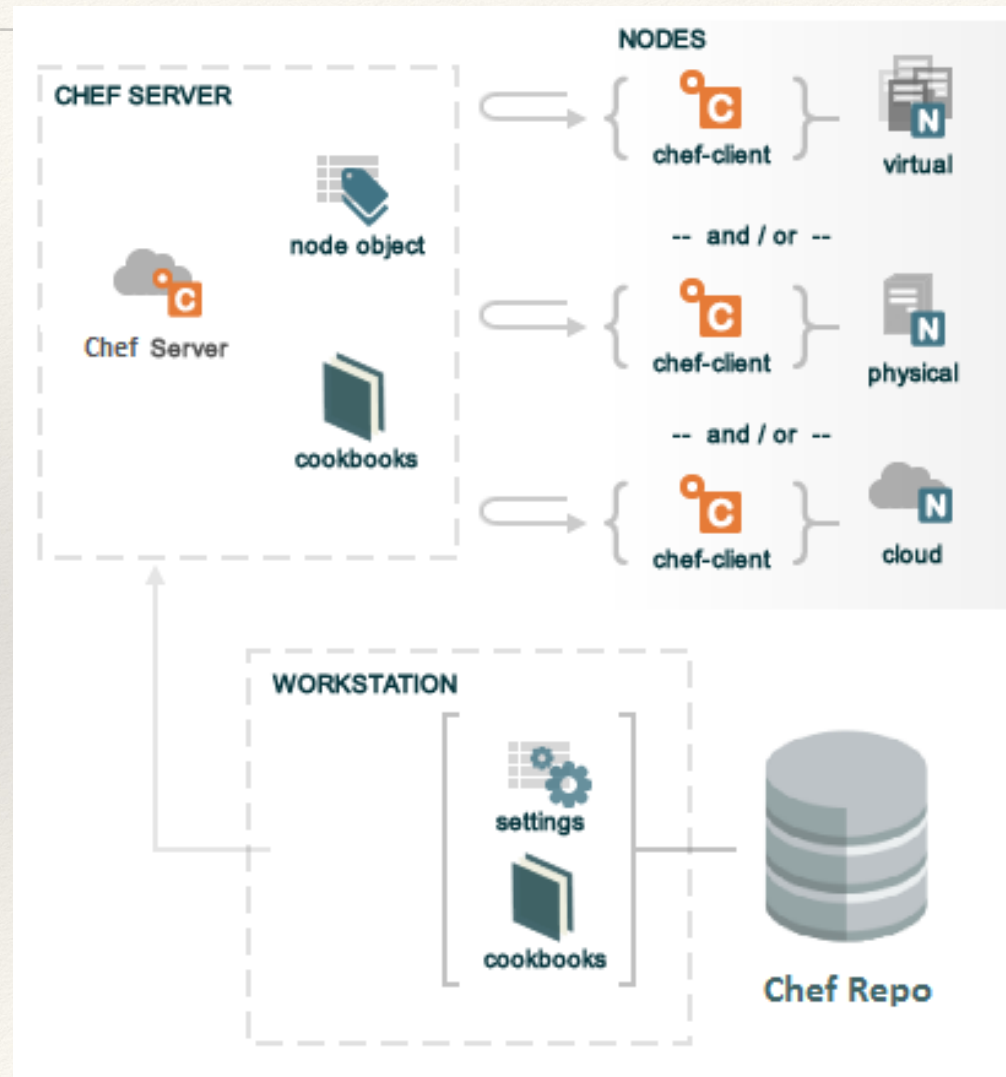

CAMEL

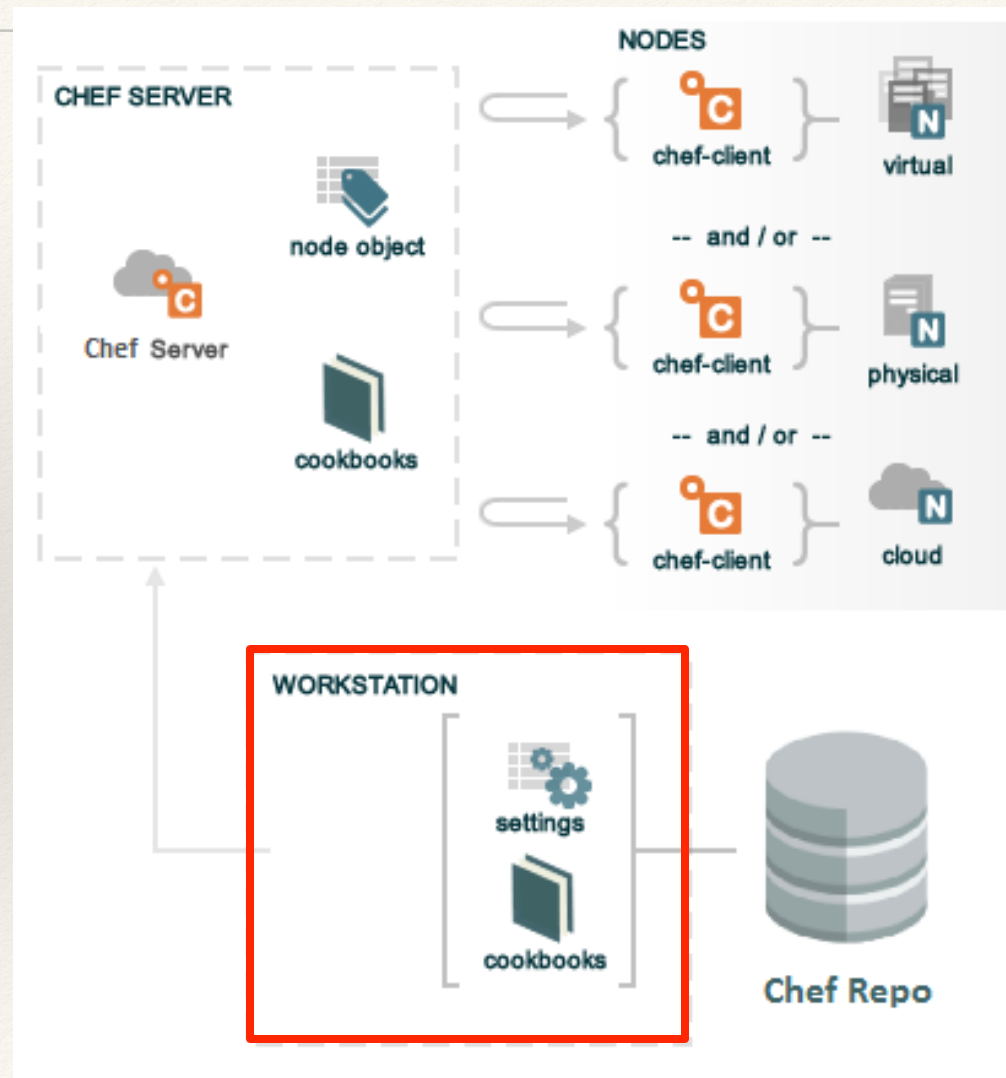Cloud X

Cloud Y

Cloud Z
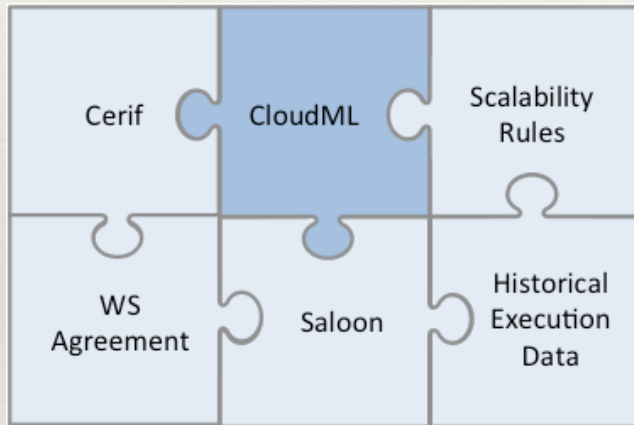
Motivation

CAMEL

Chef configuration management

Chef configuration management
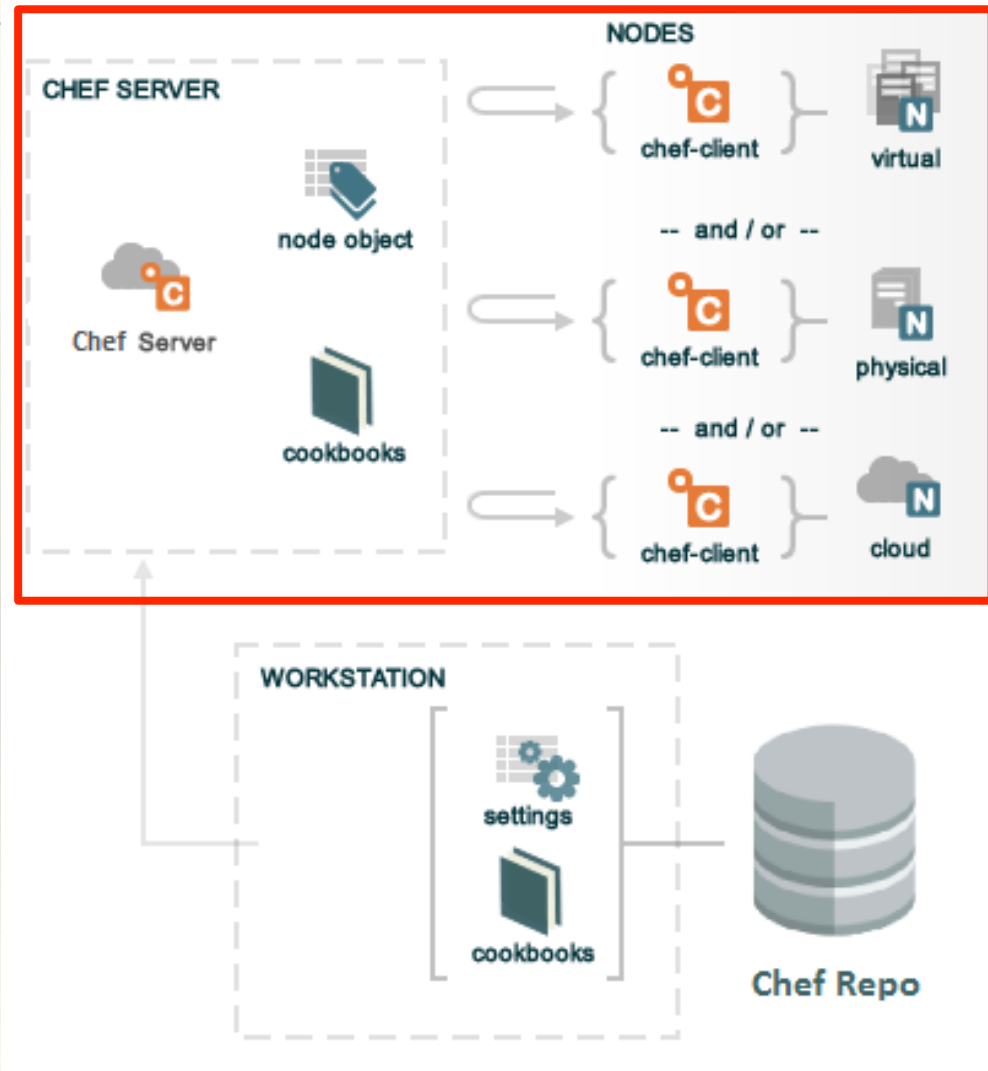
❖ Cookbooks – Recipes

Chef configuration management

❖ Cookbooks – Recipes

❖ Nodes – Run-lists

Chef configuration management

❖ Cookbooks – Recipes

❖ Nodes – Run-lists

❖ Chef Repo

C2C overview

C2C overview

CAMEL model parser

-create VM list
-create component list
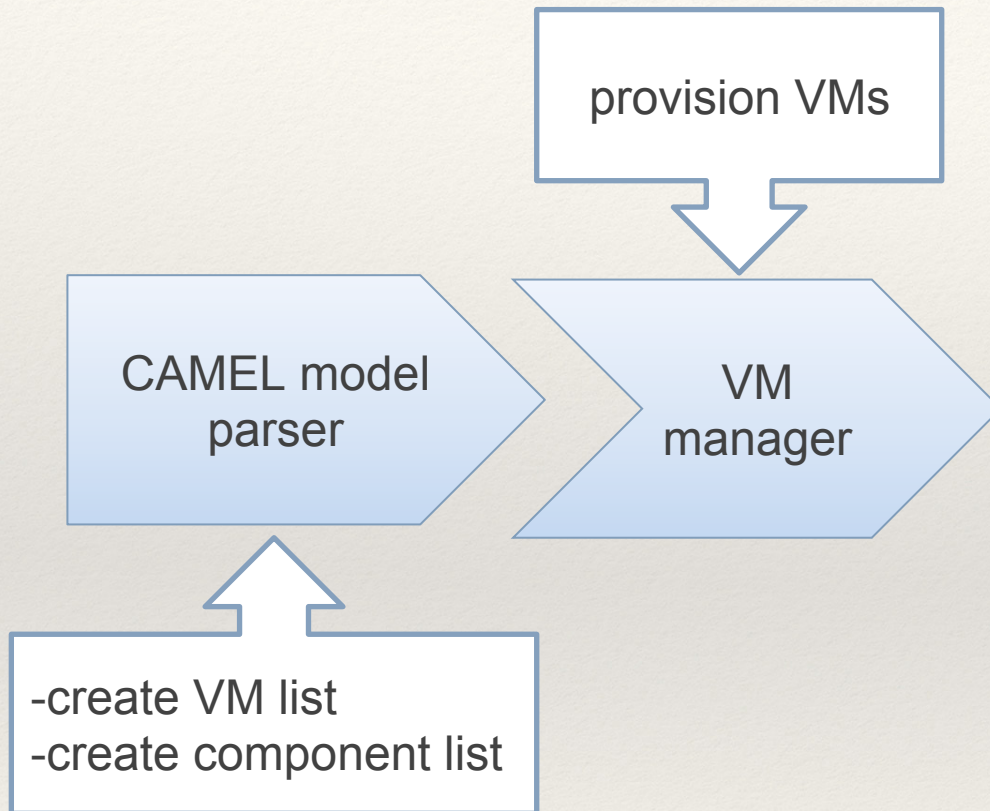
C2C overview

provision VMs

CAMEL model parser

VM manager

-create VM list
-create component list

C2C overview

provision VMs

CAMEL model parser → VM manager → Chef instructor

-create VM list
-create component list
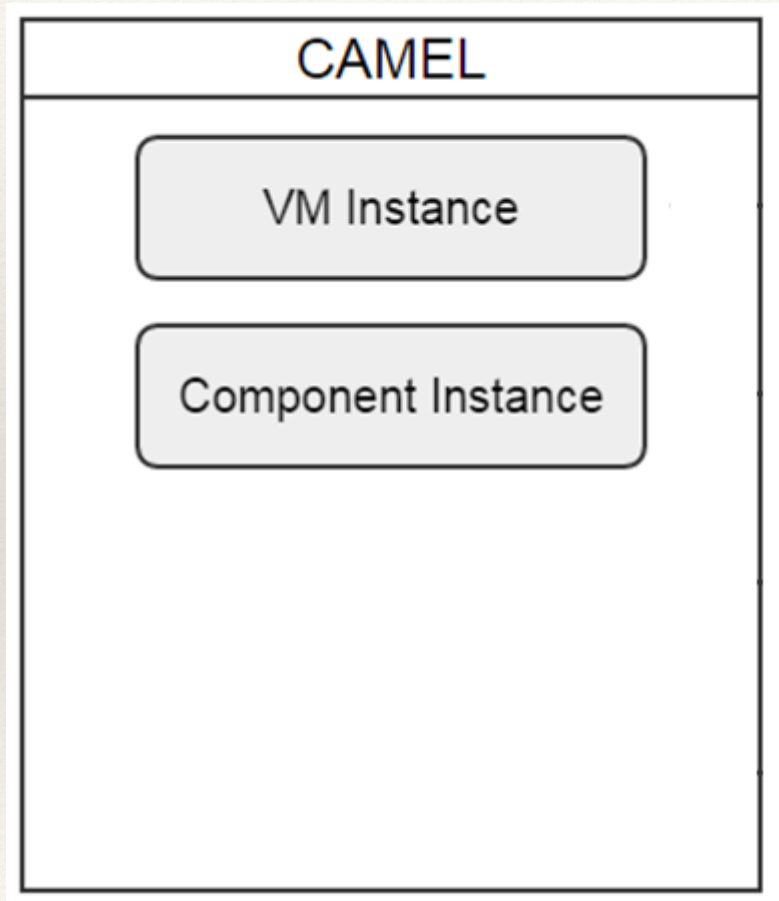
-manage cookbooks
-compose run-lists
-determine configuration order
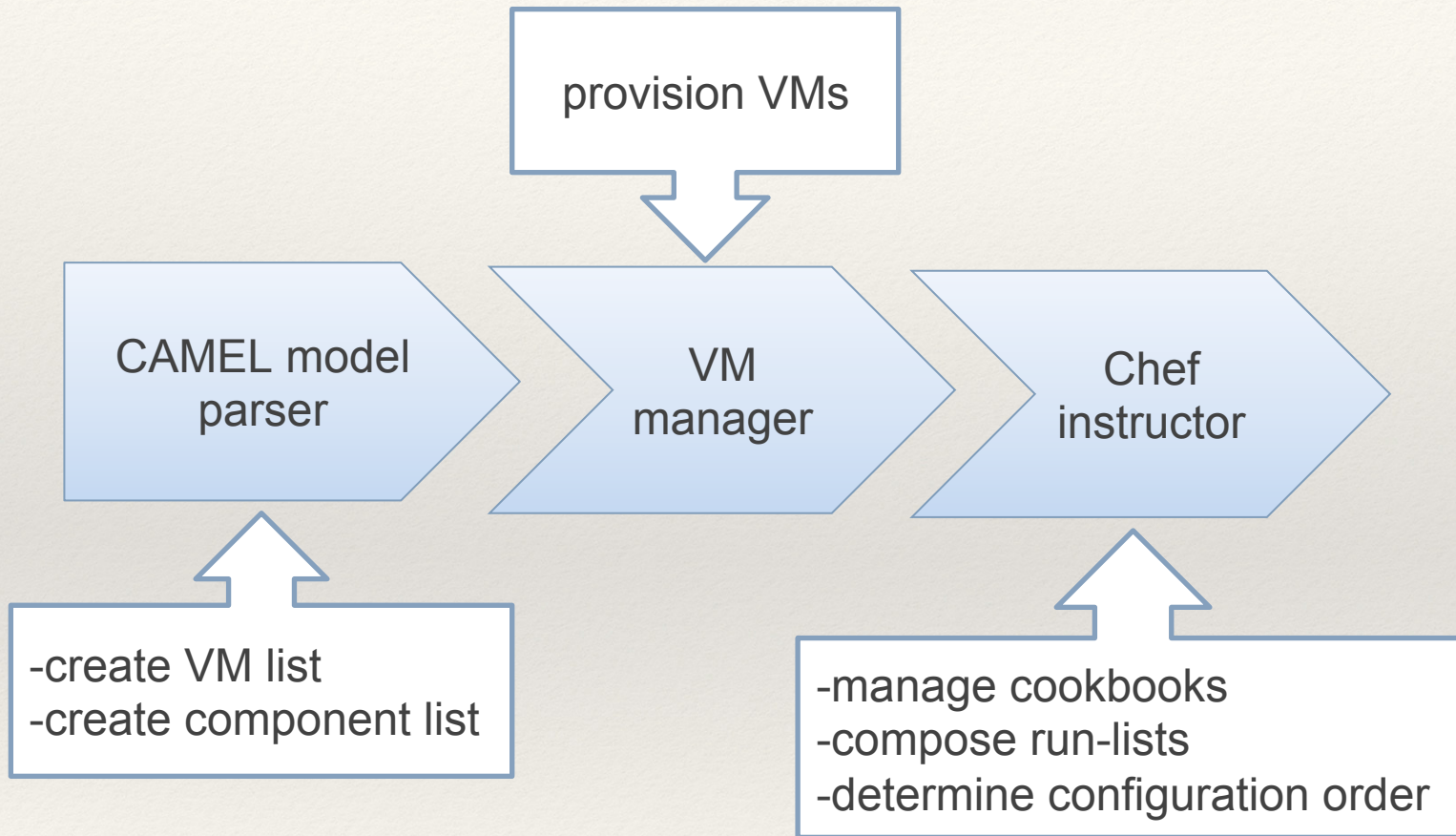
CAMEL Concepts
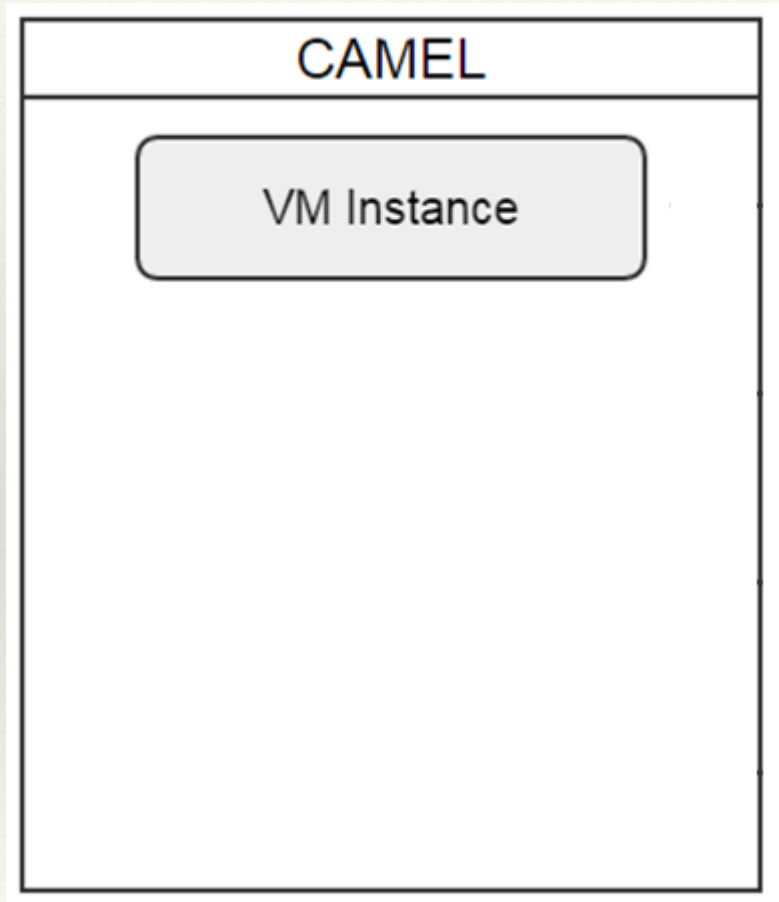
CAMEL Concepts

CAMEL Concepts
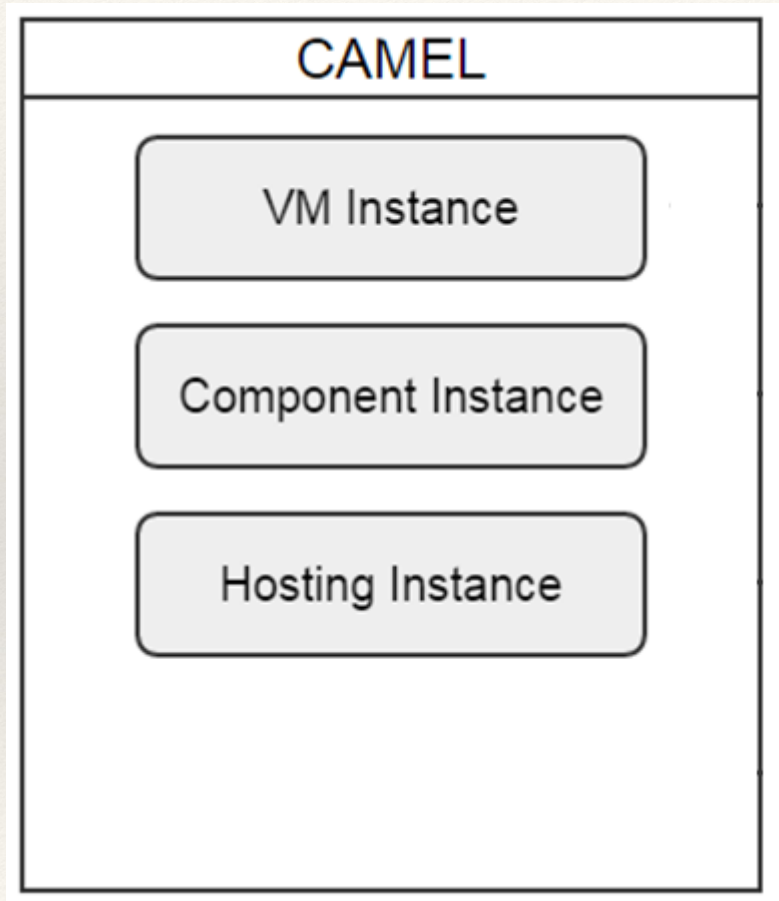
CAMEL Concepts

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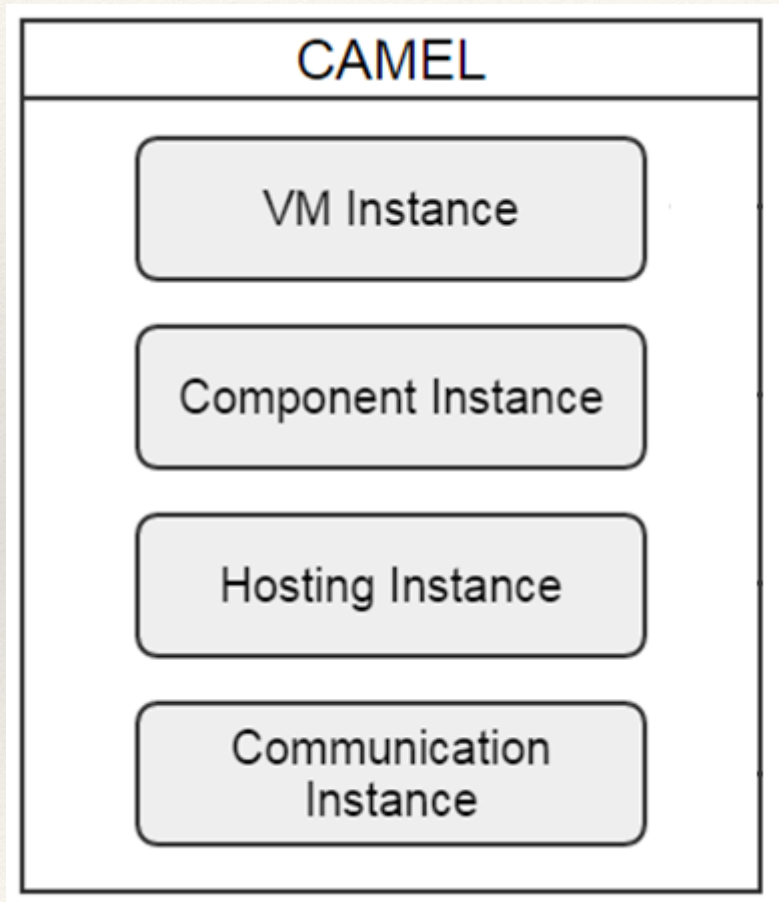
From CAMEL to Chef

CAMEL
App Model

C2C

VM list

Component
List

VM
Manager
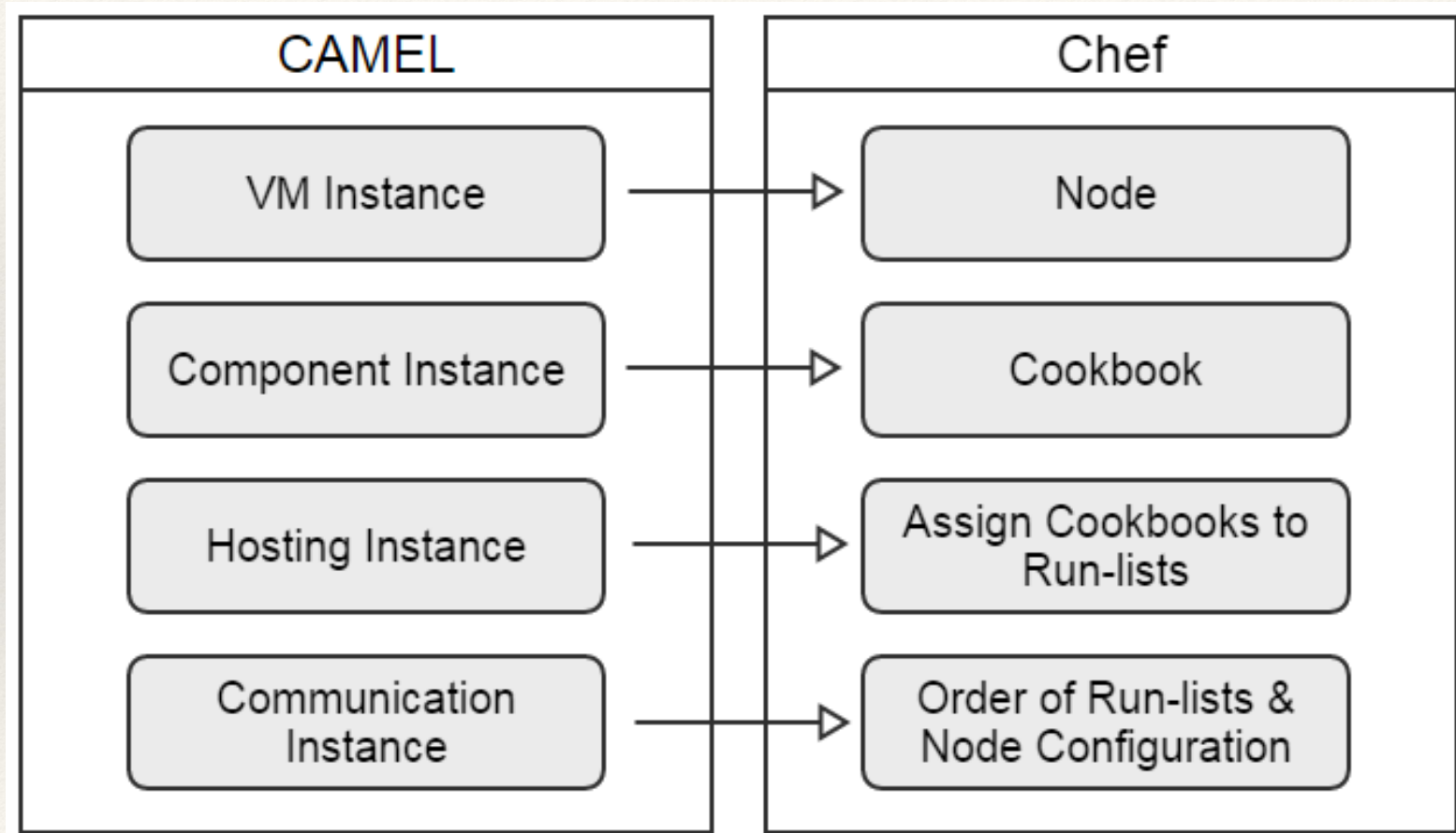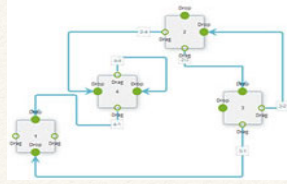
Chef
Instructor

Cloud X

Cloud Z

CAMEL
App Model

C2C

VM list

Component
List

VMv
Manager

Chef
Instructor

provision

provision

Cloud X

Cloud Z

CAMEL
App Model

Chef Repo

C2C

VM list

Component
List

cookbooks   recipes   attributes

VM
Manager

Chef
Instructor

provision

provision

Cloud X

Cloud Z

CAMEL
App Model

Chef Repo

C2C

VM list

Component
List

cookbooks   recipes   attributes

VM
Manager

Chef
Instructor

provision

provision

run-list

run-list

Cloud X

Cloud Z

Use case

- ❖ SPEC jEnterprise 2010

- ❖ Multi-tier distributed application

- ❖ Online web store

specj.ear

mySQL

JBoss

DB_VM
m3.medium

Server_VM
A1

Amazon EU

Microsoft Azure EU

Hosting

Communication

Application
Component

Virtual
Machine
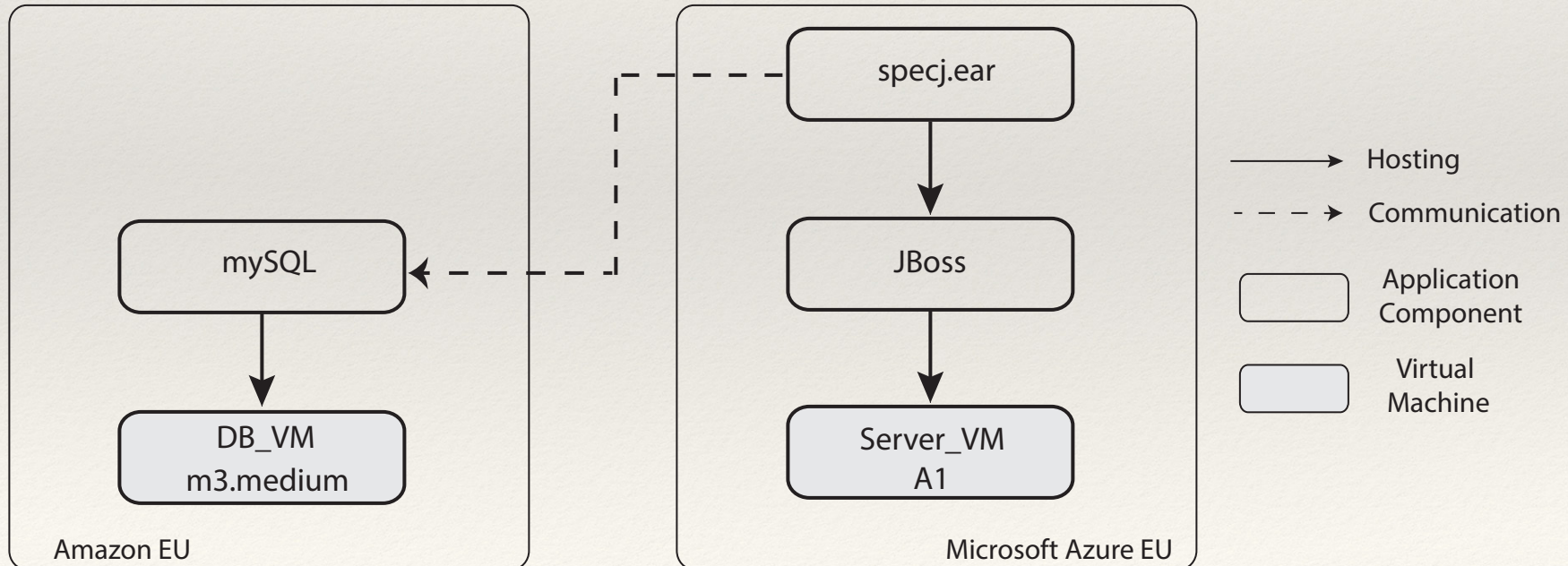
Chef run-lists and configuration

DB_VM node

Server_VM node

🟩 Chef Supermarket Cookbooks

🟦 Custom Cookbooks

Chef run-lists and configuration

DB_VM node

recipe:: mysql

Server_VM node

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🟦 Custom Cookbooks

Chef run-lists and configuration

DB_VM node

recipe:: mysql

Server_VM node

recipe::JBoss
recipe:: specj

🟩 Chef Supermarket Cookbooks

🟦 Custom Cookbooks

Chef run-lists and configuration

DB_VM node

recipe:: mysql

1

Server_VM node

recipe::JBoss
recipe:: specj

2
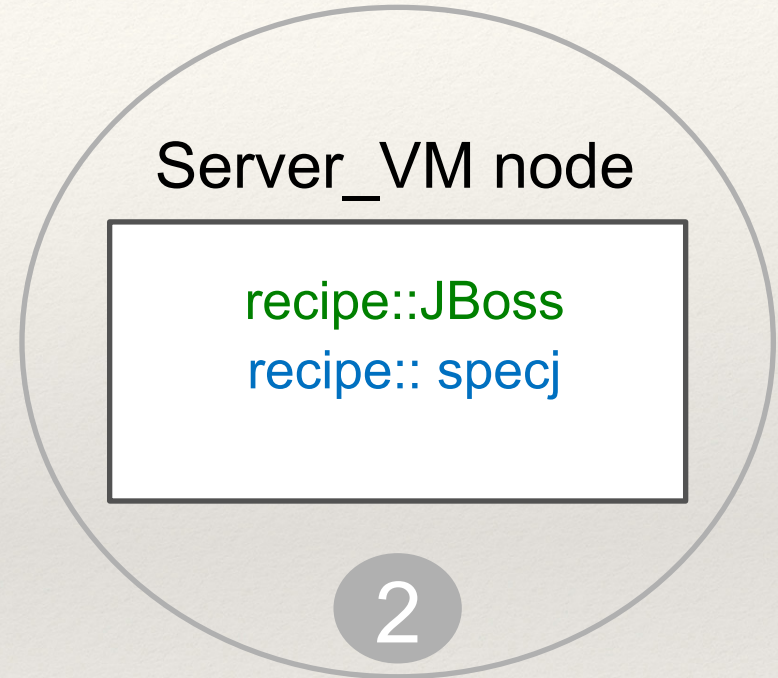
🟩 Chef Supermarket Cookbooks

🟦 Custom Cookbooks

Challenges

Find correct *cookbook* for application components

- Fill in the cookbook name in the CAMEL model

  - e.g. cookbook = "jboss"

- Cookbook with minimal lexicographical distance

  - e.g. component "j-boss" → cookbook = "jboss"

- Use cookbooks for CAMEL components

Challenges

What if cookbook does not exist

❖ Compose custom cookbook

  ❖ Manual composition

  ❖ Automatic composition in a standardized way

Challenges

Choose the right *recipe* for the desired task

❖ Fill in the recipe name in the CAMEL model

❖ Assign unique keywords to basic recipe

  ❖ e.g. install, start etc.

❖ Expert chef users map recipe names to keywords

Conclusion

- Introduced C2C framework

- Automated configuration and deployment of CAMEL application models with Chef

- Discussed challenges and ways to address them

- Experience with C2C on a real application use case

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