MINISTERUL EDUCAȚIEI ȘI CERCETĂRII AL REPUBLICII MOLDOVA

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Facultatea Calculatoare Informatică și Microelectronică

Departamentul Ingineria Software și Automatică

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Studiul infrastructurii hiperconvergente în baza platformei „Harvesterhci”

Teză de master

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ADNOTARE

Numele, prenumele autorului: Zaruba Dmitri

Titlul tezei: Studiul infrastructurii hiperconvergente in baza platformei „Harvesterhci”

Program de master: Ingineria software

Structura lucrării: Introducere, 3 capitole, concluzii, 2 anexe, 36 figuri, 2 tabele, 65 pagini de text, 20 referințe bibliografice

Cuvinte cheie: infrastructură hiper-convergentă, Harvester, Rancher, Kubernetes cluster, mașină virtuală

Scopul tezei: Cercetare și creare, infrastructură hiperconvergentă bazată pe platforma „Harvesterhci”.

Obiectivele tezei: Identificarea si analiza tipurilor de infrastructuri. Avantajele și dezavantajele „Infrastructurii hiperconvergente”, în comparație cu alte infrastructuri. Analiza modalitatilor de creare a infrastructurilor hiperconvergente. Crearea unei infrastructuri hiperconvergente, in baza platformei „Harvesterhci”. Analiza resultatelor obtinute.

Materiale și metode: analiza surselor de informatii despre infrastructurile IT, realizarea experimentala a unei infrastructuri hiperconvergente folosind platforma Harvesterhci, observarea si analiza rezultatelor obtinute

Importanța teoretică și practică a tezei: Studiu experimental al unei noi imagini asupra infrastructurii hiperconvergente, care permite utilizarea unei singure platforme pentru a lucra cu mașini virtuale și containere

Capitolul 1 „Introducere în infrastructura hiperconvergentă bazată pe Harvester” va analiza tipurile de infrastructuri IT existente: evoluția de la infrastructura tradițională la infrastructura hiperconvergentă, diferențele și asemănările acestora, precum și aspectele platformei Harvester ca infrastructură hiperconvergentă.

Capitolul 2 „Implementarea, configurarea și monitorizarea platformei Harvester” va explora aspectele tehnice ale platformei Harvester, și anume arhitectura: cerințele de utilizare și elementele din care este construită platforma. Tot în acest capitol, vom arăta procesele de implementare a platformei și de creare a unei mașini virtuale în Harvester.

Capitolul 3 „Integrarea Harvester cu Rancher” va arăta aspecte ale integrării Rancher cu Harvester și cum se instalează Rancher. De asemenea, vom descrie procesul de integrare a Harvester în Rancher și procesul de creare și gestionare a unui cluster Kubernetes în Harvester folosind Rancher.

ANNOTATION

Last name, first name of the author: Zaruba Dmitri

Thesis title: The study of the hyperconverged infrastructure based on the "Harvesterhci" platform

Master's program: Software engineering

Structure of the paper: introduction, 3 chapters, conclusions, 2 annexes, 36 figures, 2 tables, 65 pages of text, 20 bibliographical references

Keywords: hyper-converged infrastructure, Harvester, Rancher, Kubernetes, KubeVirt, Docker, containers, cluster, virtual machine

The purpose of the thesis: Research and creation, hyperconverged infrastructure based on the "Harvesterhci" platform

The objectives of the thesis: Identification and analysis of infrastructure types. The advantages and disadvantages of "Hyperconverged Infrastructure", compared to other infrastructures. Analysis of the ways to create hyperconverged infrastructures. Creation of a hyperconverged infrastructure, based on the "Harvesterhci" platform. Analysis of the obtained results.

Materials and methods: analysis of sources of information about IT infrastructures, experimental creation of a hyperconverged infrastructure using the Harvesterhci platform, observation and analysis of the results obtained

Theoretical and practical importance of the thesis: Experimental study of a new look at hyperconverged infrastructure, which allows using a single platform to work with virtual machines and containers

Chapter 1 " Introduction to hyperconverged infrastructure based on Harvester" will analyze the types of existing IT infrastructures: the evolution from traditional to hyperconverged infrastructure, their differences and similarities, and aspects of the Harvester platform as a hyperconverged infrastructure.

Chapter 2 "Deploy, configuration and monitoring of the Harvester platform" will explore the technical aspects of the Harvester platform, namely the architecture: requirements for use and the elements that the platform is built from. Also in this chapter, we will show the processes of deploying the platform and creating a virtual machine in Harvester.

Chapter 3 "Integrate Harvester with Rancher" will show aspects of integrating Rancher with Harvester and how to install Rancher. We will also describe the process of integrating Harvester into Rancher and the process of creating and managing a Kubernetes cluster in Harvester using Rancher.

CONTENTS

ABBREVIATIONS

API - Application Programming Interface

ARP - Address Resolution Protocol

CDN - Content Delivery Network

CI/CD - Continuous Integration/Continuous Delivery

CNI - Container Network Interface

DHCP - Dynamic Host Configuration Protocol

DNS - Domain Name System

GUI - Graphical User Interface

HCI - Hyper-Converged Infrastructure

HPE - Hewlett Packard Enterprise

KVM - Kernel-based Virtual Machine

MAC - Media Access Control

NIC - Network Interface Card

PXE - Preboot Execution Environment

RBAC - Role-Based Access Control

RKE - Rancher Kubernetes Engine

SAN - Storage Area Network

SAP - System Applications and Products

SSH - Secure Socket Shell

SSL - Secure Sockets Layer

TCO - Total Cost of Ownership

VIP - Virtual IP

VM - Virtual Machine

WSL - Windows Subsystem for Linu

INTRODUCTION

Actuality and importance of the chosen theme: Information Technology (IT) is becoming increasingly important to modern life as so much of everyday existence has become digital. Without IT infrastructure to keep this information organized and operational, so much of our world would cease functioning.

IT infrastructure refers to various components required to run IT and IT-enabled operations. These include software, composite hardware, network services, and resources. The infrastructure enables organizations to deliver services and solutions to customers, partners, and employees. It can be deployed on owned facilities or hosted by third-party service providers.

A well-designed information systems infrastructure relies on a coherent implementation that supports responsive change. Organizations can leverage the system to ensure agility, which is vital for responding to new business or administrative initiatives. A variety of specialists manages the entire system.

Globalization presents new challenges to implementing complex infrastructure that spans many national boundaries. The implementation process requires extensive planning to ensure consistency. A good information technology infrastructure supports corporate initiatives, acquisitions, mergers, and transformations. The system plays an essential when it comes to improving operational efficiency and creating meaningful options for the future.

Hyperconverged infrastructure did not exist as a concept 10 years ago. Today, it is one of the fastest-growing methods for implementing IT in the data centre as IT departments look for ways to adapt to their new business role and the demands placed on them. There is pressure on IT departments to provide resources instantly; more and more applications are best suited to expansion systems built using core components; Software-defined storage promises big efficiency gains; data volume growth is unpredictable.

More and more enterprises are looking at creating software products and services as a way to increase revenue and therefore want to adopt agile software development methodologies, which require a high degree of flexibility on the part of IT. In other words, they want to build software and deploy it more often than before, so IT needs to be ready to get new applications up and to run quickly.

The purpose of the thesis: Research and creation, hyperconverged infrastructure based on the "Harvesterhci" platform.

The following tasks were used to achieve this purpose:

- Identification and analysis of infrastructure types;
- Advantages and disadvantages of "Hyperconverged Infrastructure", compared to other;
- Creation of a hyperconverged infrastructure, based on the "Harvesterhci" platform.

Methodologies: analysis of sources of information about IT infrastructures, experimental creation of a hyperconverged infrastructure using the Harvesterhci platform, observation and analysis of the results obtained

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