**Kubernetes- the evolution of virtualization**

**Abstract:**

The aim of this paper is, based on the analysis and deployment of various distributions of the Kubernetes cluster, to design the production deployment of the given distributions. The field of cloud computing has been evolving rapidly since its inception. Cloud is the virtual pool of resources which can be served to the user through SaaS, PaaS and IaaS flavors. No cloud can exist without virtualization. With Virtual Machine, the bare metal is virtualized to run multiple Operating System instances. These VMs serve the users for performing the tasks. All are independent units and the user has complete ownership and control to install the required software and use as per the wish. The VM solves many problems by optimizing the resources. Deployments are documented and the advantages and disadvantages of selected distributions are evaluated. The paper consists of five parts. The first part is devoted to the issue of virtualization and containerization. The issue of orchestration and automation is also described here. The second part describes the Kubernetes containerization and orchestration tools and their position on the market. The third part defines the objectives of the work and sets the production requirements that individual distributions should meet. The fourth part of the work is devoted to the deployment and explanation of selected Kubernetes distributions. There is an infrastructure design for the clusters and the necessary configuration to meet the set production requirements. The last part is devoted to the evaluation and recommendation of distribution for the production deployment of the Kubernetes cluster.

**Introduction:**

Kubernetes, also known as K8s, is an open-source platform for managing containerized applications. It was originally developed by Google and is now maintained by the Cloud Native Computing Foundation (CNCF). At its core, Kubernetes provides a way to orchestrate and manage containers, which are lightweight, standalone executable packages that contain everything needed to run an application, including code, libraries, and dependencies.Kubernetes allows you to automate the deployment, scaling, and management of containerized applications across multiple hosts, whether they are physical machines, virtual machines, or cloud instances. This makes it easier to deploy and manage complex, distributed applications that may consist of multiple containers and services.

Kubernetes provides a rich set of features, including Automated deployment and scaling of containers, Load balancing and service discovery, Storage orchestration, Self-healing capabilities, Secret and configuration management, Rolling updates and rollbacks, Monitoring, and logging.

Kubernetes uses a declarative approach to configuration, which means you define the desired state of your application and Kubernetes takes care of the rest. This allows you to focus on what your application should do, rather than how it should do it. Overall, Kubernetes is a powerful platform that can help you simplify and streamline the management of containerized applications at scale.