Assignment2

1.

(a) Orchestration tools like Kubernetes help manage and scale application servers by:

1. Automatically distributing containers across multiple nodes
2. Monitoring resource usage and health status
3. Automatically restarting failed containers
4. Scaling applications up or down based on demand
5. Load balancing traffic across multiple instances

(b) These tools facilitate automation through:

1. Deployment: Automated rollout and rollback of application versions
2. Scaling: Horizontal scaling based on CPU/memory usage or custom metrics
3. Management: Self-healing capabilities, automated restarts, and health checks

2.

* 1. Pod: The smallest deployable unit in Kubernetes, containing one or more containers that share storage and network
  2. Deployment: A controller that manages the desired state of Pods, handles updates, and maintains a specified number of replicas
  3. Service: A stable network endpoint that provides load balancing and service discovery for Pods

3.

A Namespace is a logical isolation mechanism in Kubernetes that divides cluster resources between multiple users or projects.

Example: kubectl create namespace production

4.

The Kubelet is an agent that runs on each node, ensuring containers are running in Pods and reporting node status to the API server.

Command to check nodes: kubectl get nodes

5.

ClusterIP: Default type, exposes service only within the cluster (internal access)

NodePort: Exposes service on each node's IP at a static port (external access via node IP)

LoadBalancer: Provisions an external load balancer (cloud provider integration)

6.

kubectl scale deployment <deployment-name> --replicas=5

7.

Use rolling update: kubectl set image deployment/<deployment-name> <container-name>=<new-image>

8.

kubectl expose deployment <deployment-name> --type=LoadBalancer --port=80

9.

The scheduler considers:

1. Resource requirements and availability
2. Node selectors and affinity rules
3. Taints and tolerations
4. Pod priority and preemption

10.

* Ingress: Manages external HTTP/HTTPS access, provides URL routing, SSL termination, and name-based virtual hosting
* Service: Provides internal cluster networking and basic load balancing