What Happens After Running a kubectl Command?

1. User Executes Command (kubectl exec)

Command: kubectl exec -it nginx -- bash

Type of communication: Two-way communication (uses WebSocket for continuous interaction).

2. kubectl Sends HTTPS Request to kube-api-server

kubectl sends a request to the kube-api-server (over HTTPS).

3. kube-api-server Negotiates WebSocket Connection

For two-way communication commands (like exec), the API server negotiates the upgrade to WebSocket for continuous message exchange.

4. kube-api-server Forwards Request to kubelet

The kube-api-server makes an HTTPS request to the kubelet responsible for managing containers and pods.

5. kubelet Receives Request

The kubelet (running on the node where the pod resides) processes the request. It provides interfaces for container lifecycle management, including operations like /exec, /attach, and /portForward.

6. kubelet Communicates with CRI (Container Runtime Interface)

The kubelet sends a gRPC request to the CRI (Container Runtime Interface) to execute the command inside the container.

7. CRI Executes Command

The CRI component interacts with the container runtime to execute the command (e.g., starting a shell inside the container). It uses the RuntimeService.Exec or RuntimeService.Attach methods.

8. Result Returned to kubelet

The output (stdout/stderr) of the command is passed back from the container runtime to the kubelet.

9. kubelet Forwards Result to kube-api-server

The kubelet forwards the result (command output) to the kube-api-server.

10. kube-api-server Sends Result Back to kubectl

The kube-api-server sends the result (e.g., terminal output) back through the WebSocket connection.

11. kubectl Displays the Output

The output is displayed in the terminal for the user.

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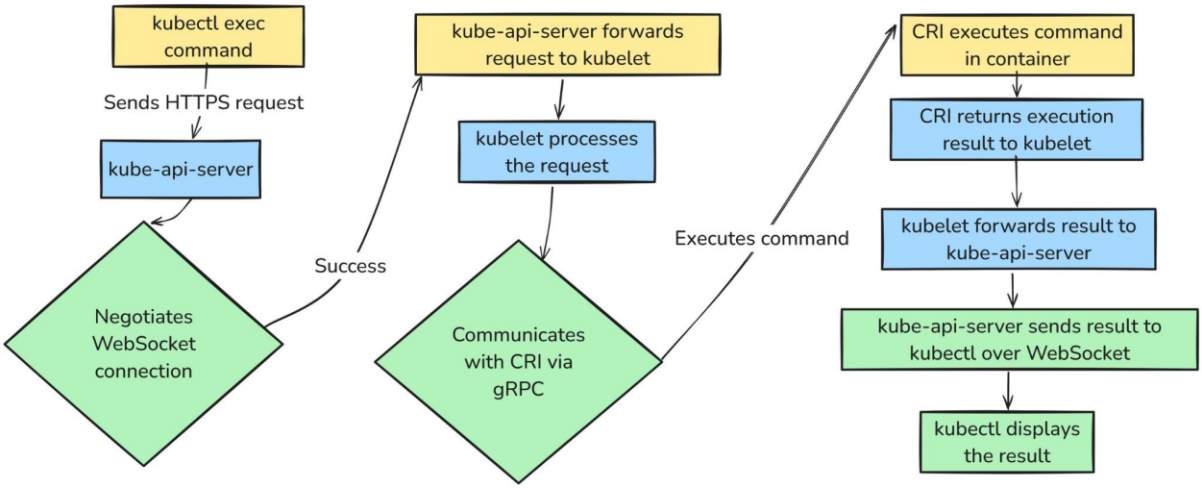

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