

# Automated Dependency Resolution in Container Orchestration

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Container orchestration is a critical component of modern software deployment and management of complex applications. While multi-node orchestration systems like Kubernetes have successfully addressed automatic dependency resolution and container lifecycle management [?], single-node container orchestration remains lacking in these essential capabilities [?]. Deployments require manual configuration and adjustment that increases complexity during deployment and leaves systems vulnerable to unexpected downtime.

Through the proposal of an automated dependency resolution mechanism that calculates and manages dependency trees between containers, we demonstrate that sophisticated deployments, previously available only using distributed orchestration platforms, can be effectively implemented in single-node systems without sacrificing reliability.

By eliminating the need for manual configuration, the proposed approach simplifies the deployment process, reduces the risk of human error, increases observability of the node and allows for automatic deployment of multiple, complex applications on a single node.

Overall, this talk demonstrates that intelligent dependency management and automated lifecycle control can be integrated into containerized operating systems. By solving the dependency resolution problem that has long plagued single-node environments, new possibilities are opened for simplified and secure container deployment in embedded systems and resource-constrained environments where multi-node orchestration is impractical, as well as serving as a foundation for implementing multi-node systems.

## References

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