

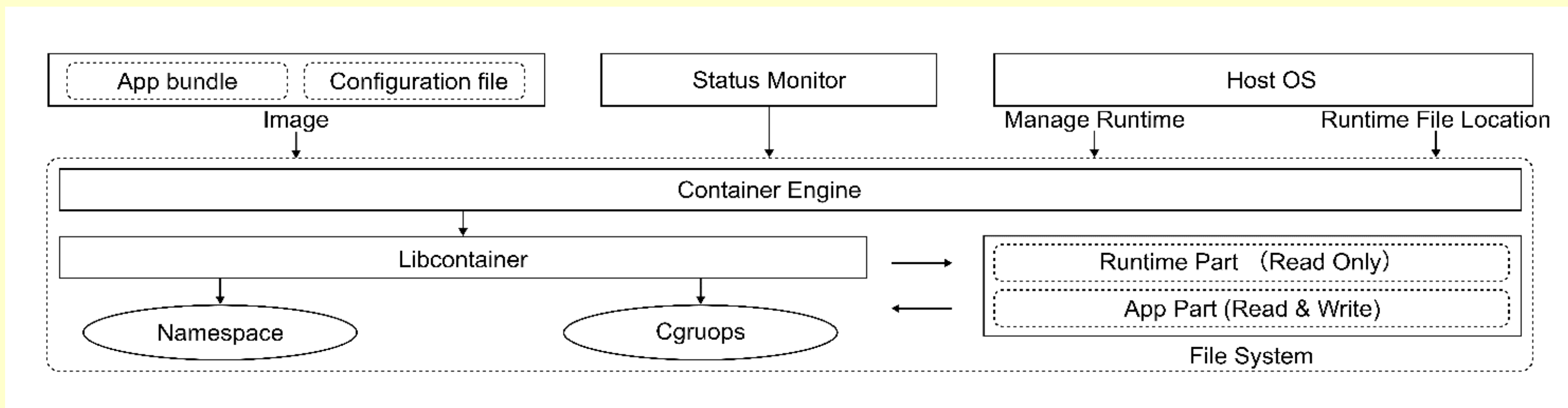
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A Lightweight Container Design Microservice-based Industrial Edge Applications

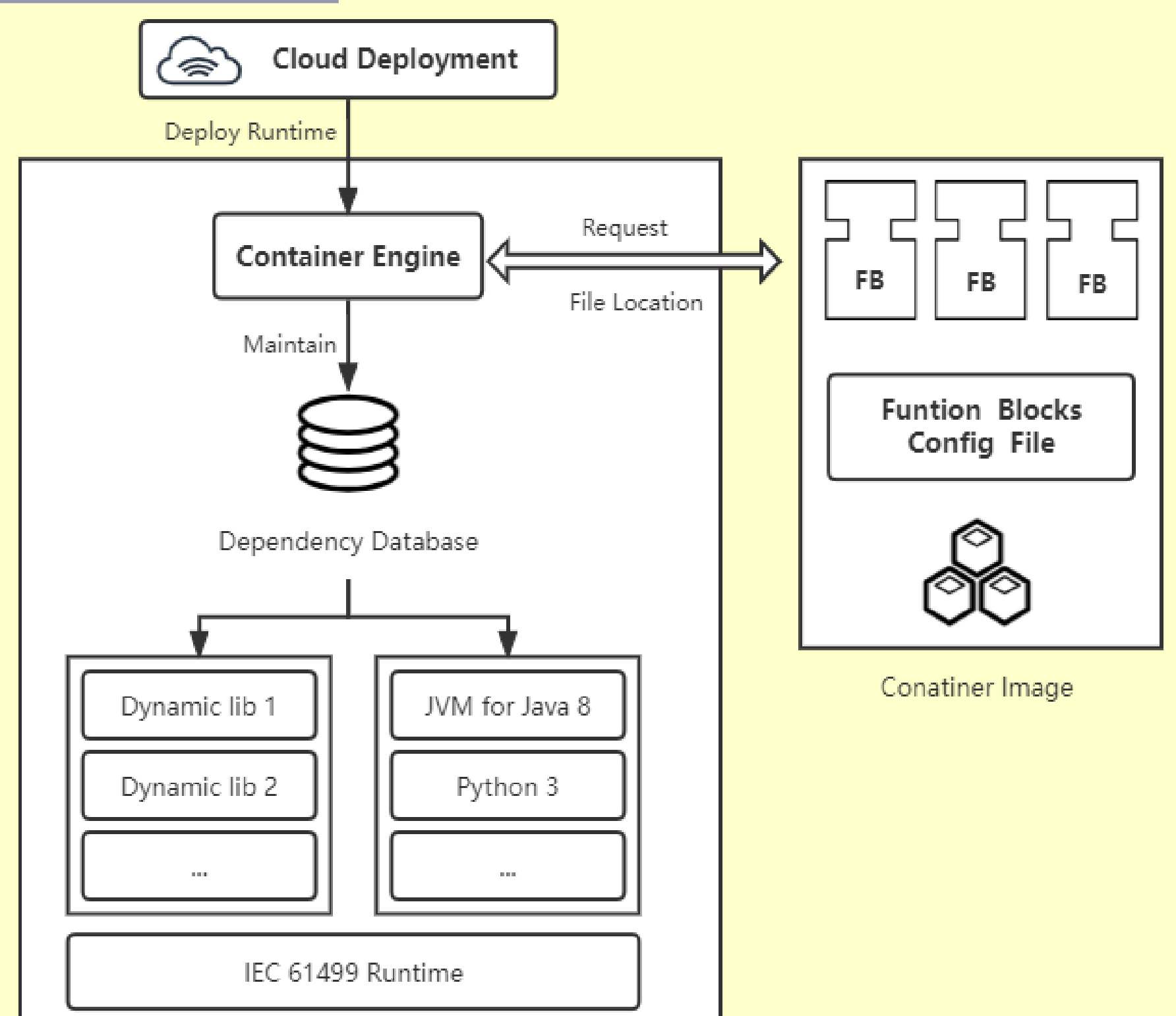
Dali Yang, Wenbin Dai

Shanghai Jiao Tong University



Overview of container design

Abstract—Industrial edge computing turns to run applications on containers for high flexibility and reusability. However, current application containers are not designed for industrial usage and are too heavy, leading to slow distribution speeds. This paper designs a series of rules to build a lightweight container and isolate hardware resources for industry IEC 61499 function blocks. The container works based on Kernel features and runs without unnecessary components for industry. Compared with current containers, such as Docker, this container is designed specifically to meet industrial requirements for real-time and reliable capability and takes up less space to enable industry users to remake and distribute functions more swiftly.



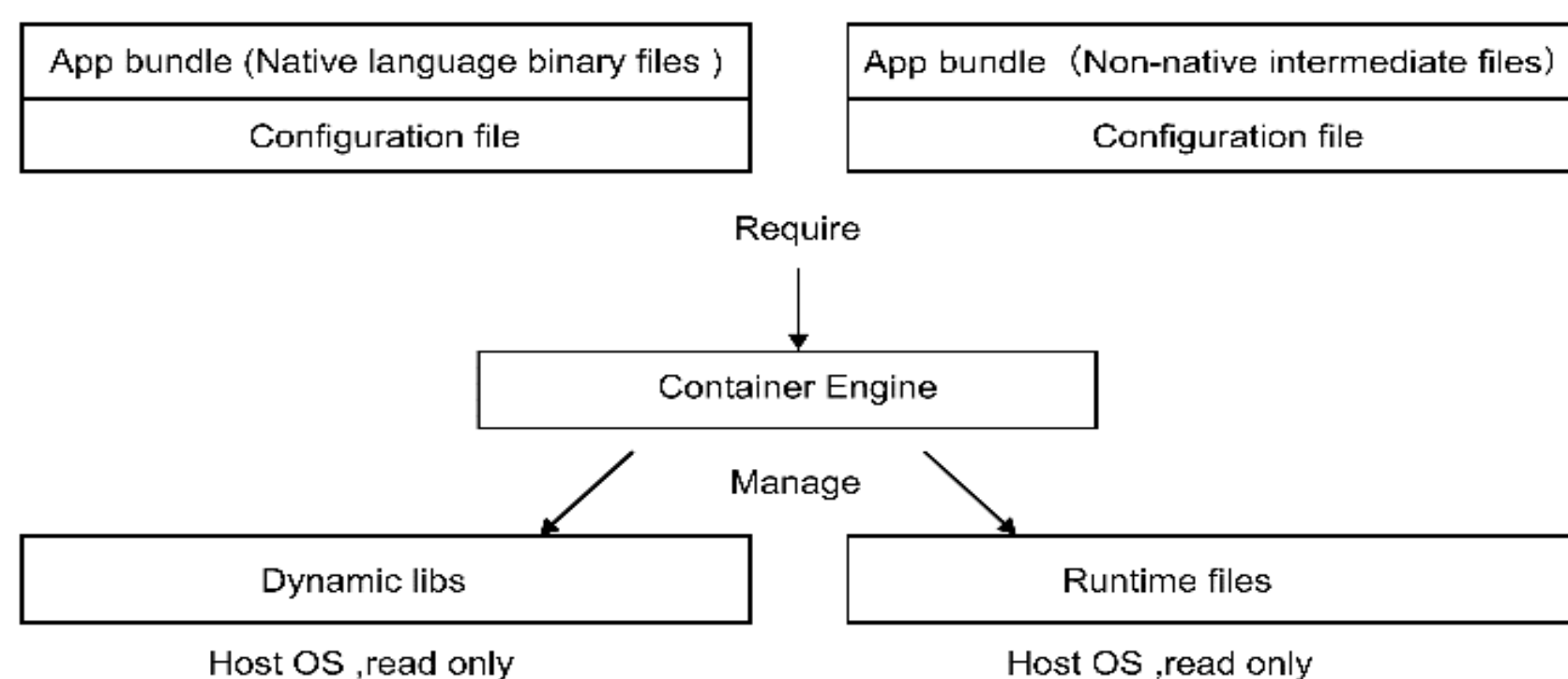
Industrial Operating System based on Linux

Sketch of System Dependency Management

Summary

In this paper, a lightweight container designed to suit the real-time and stability requirements of industrial virtualization is presented. The container provides support for IEC 61499 microservice written in a few languages. Compared with current containers, the container image takes up quite little industrial operating system resources and is swift for edge application deployment.

Basic isolation functions are provided by Kernel and work with tinier resource consumption. The container file system is designed to be convenient for rapid recovery and migration, which guarantees robustness and stability for industrial control systems.



Design for container components

A container including several function blocks as a microservice that is stored as an image including an application bundle with a configuration file. The application bundle stores the logic part, and the configuration file announces container dependency. The container engine reads the configuration file and provides essential support runtimes.

The container engine is the core part of the lightweight container and could be integrated into IEC 61499 runtime. It would manage all system-dependent files since most runtime files are not stored in the container image.