Poster: A Lightweight Live Migration Platform with Container-based Virtualization for System Resilience

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ABSTRACT

When integrated with push notifications, a live migration function can be used to ensure that systems have a high reliability in cases of hardware failures. However, the dependencies for a large range of hardware devices need to be addressed before realizing emergency live migration. Our platform introduces container-based light virtualization and an automated build function to isolate an application so that it can be deployed on different devices such as Edison, Raspberry Pi model B, BeagleBone Black, and Odroid XU3, as shown in Fig. 1.

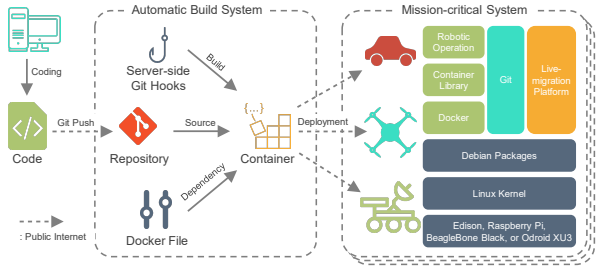

Figure 1: Our automatic deployment platform.

1. LIVE MIGRATION PLATFORM

Emergency live migration, in conjunction with a primary backup scheme, can improve the reliability of applications by coping with unexpected errors in devices. Fig. 2 shows how our platform can consolidate emergency live migration to ensure a high system resilience.

A device installed with an application container [1] conducts sensing and actuating procedures, and transmits data generated during a mission to object-based storage for a cloud application. When it discovers a faulty device, it searches for a surplus device that is available, and migrates all mission-related applications and data from the faulty device to the surplus device to continue the mission.

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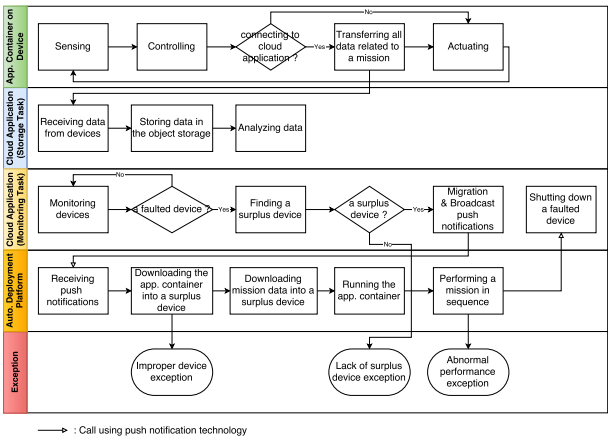

Figure 2: Proposed platform for emergency live migration.

The migration procedures are initiated by a push notification. First, the application container for the mission is downloaded onto the surplus device, and subsequently, the data needed to perform the mission are downloaded. Then the downloaded container is initialized and executed, and finally, the migration platform sends a push notification to the cloud application to shut down the faulty device.

In an experiment using a model electronic vehicle, it was observed that the right device seamlessly controlled the vehicle, despite the sudden stoppage of the left device. This demonstrates that our platform can improve the reliability of systems by facilitating emergency migration.

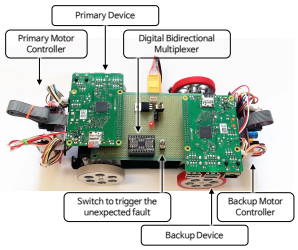

Figure 3: Testing vehicle.

2. ACKNOWLEDGMENTS

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3. REFERENCES

[1] S. Soltesz, H. Pötzl, M. E. Fiuczynski, A. Bavier, and L. Peterson. Container-based operating system virtualization: A scalable, high-performance alternative to hypervisors. In *EuroSys*, pages 275–287, March 2007.