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Should We Move to Serverless? (Advantages and Challenges)

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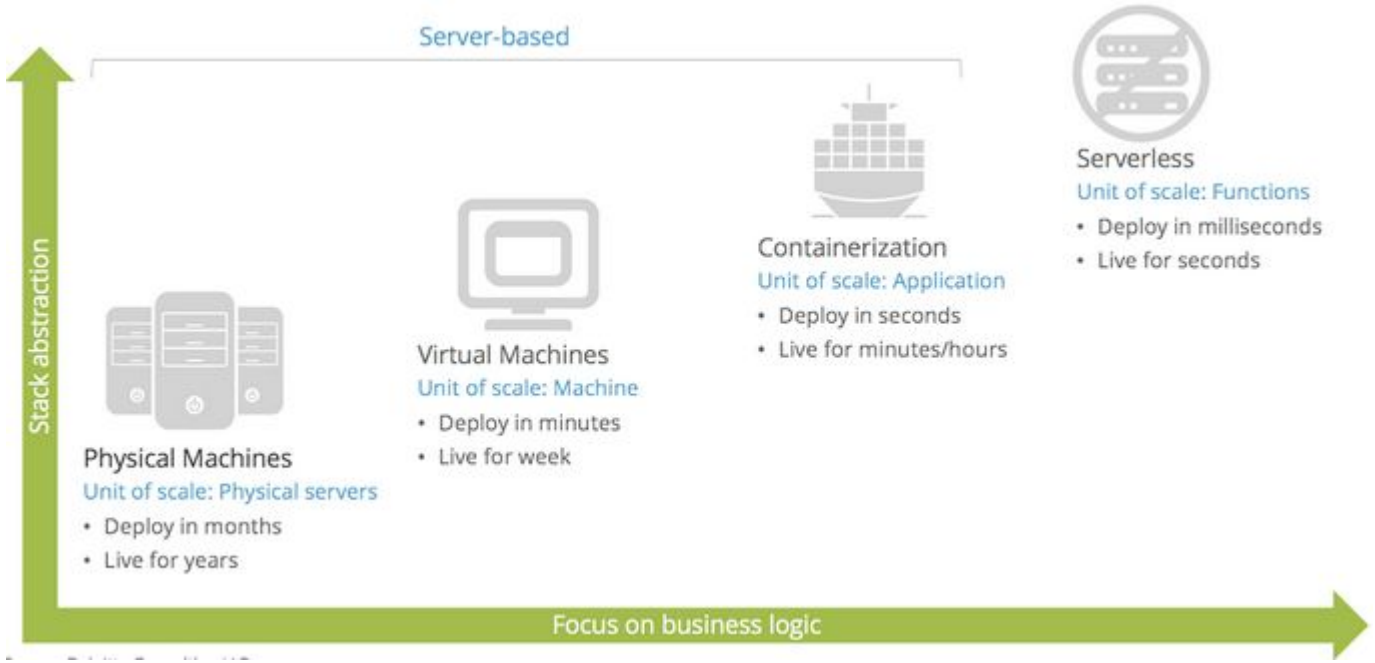
Overview

1. Quick overview of history
2. General serverless advantages/disadvantages
3. 3 Modern frameworks for Serverless
4. Demo
5. Wrap-up
6. Check out the paper!!



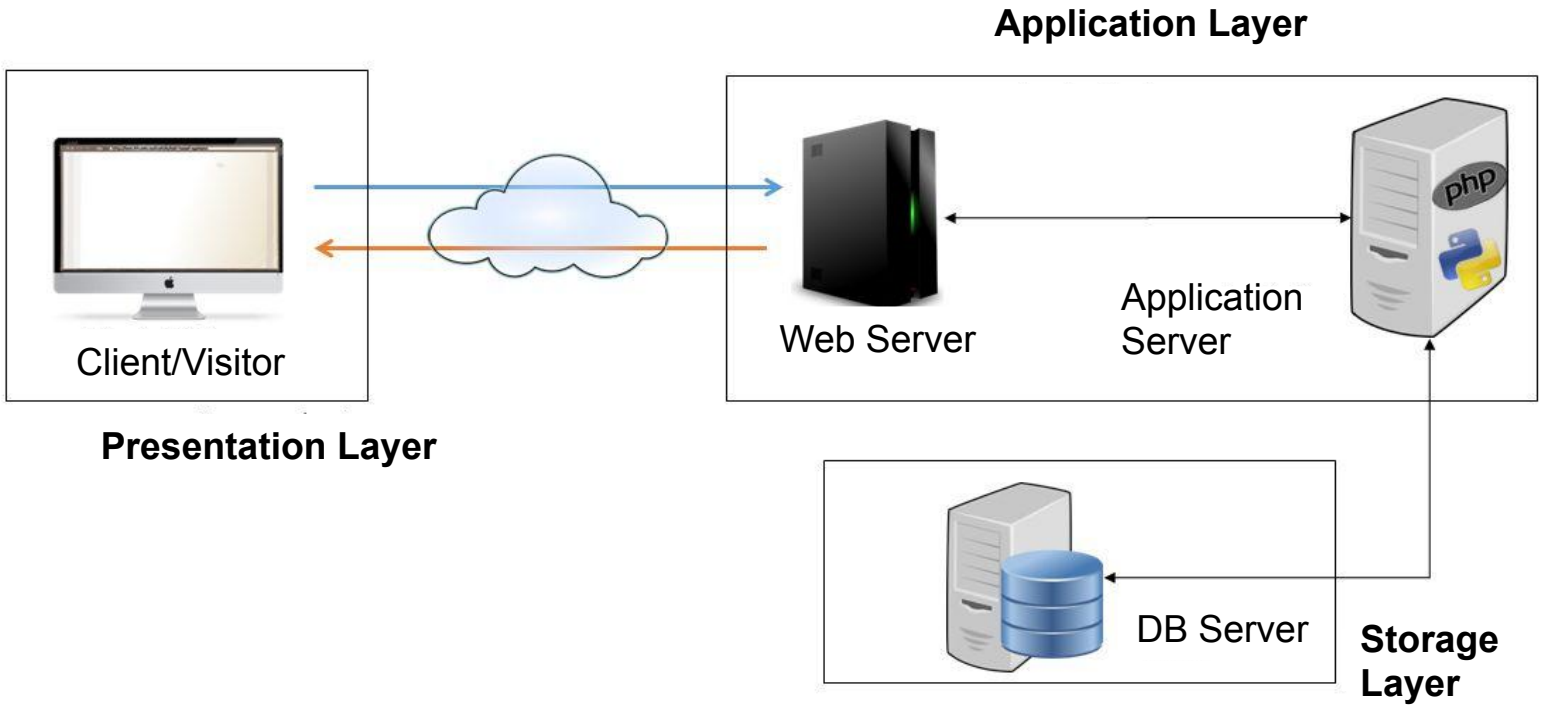
Server-Based System

Advantages:

- Low CPU Overhead
- Low Memory Overhead

Disadvantages:

- Costly
- Resource Utilization
- Scalability
- Deployment and Maintenance
- Security



Virtual Machines

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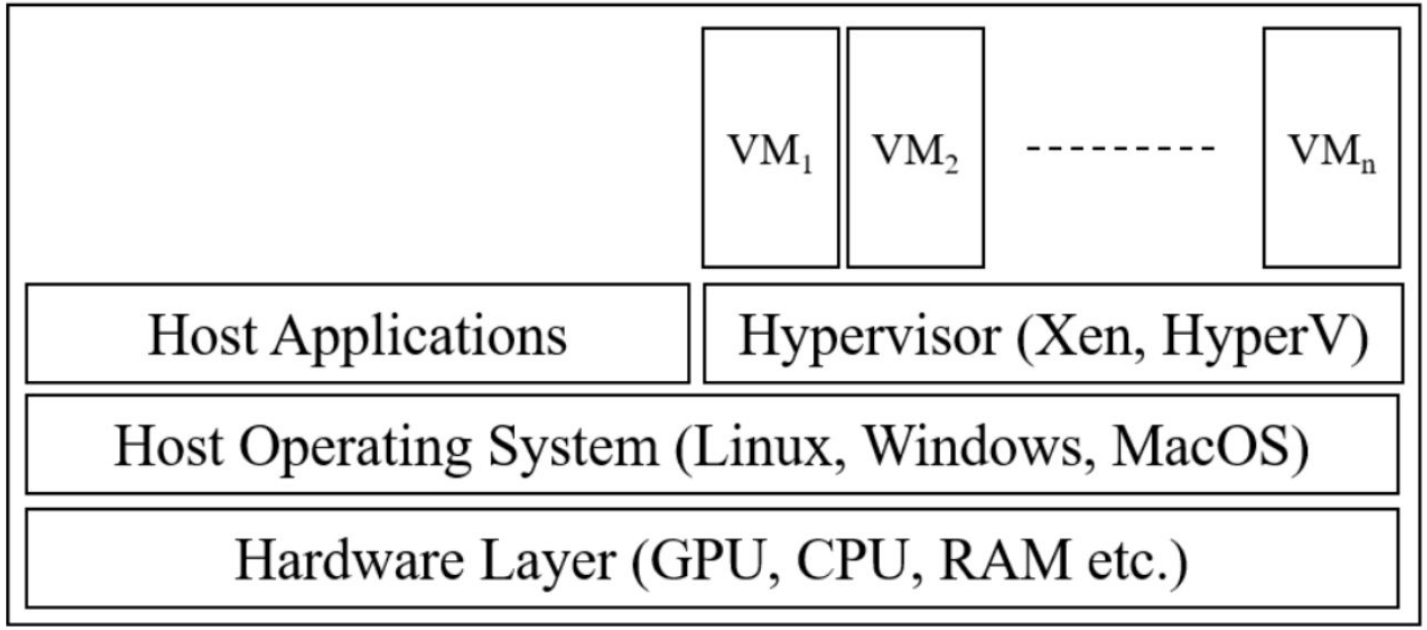
Advantages:

- Resource utilization
- Security

Disadvantages:

- CPU Overhead
- Memory Overhead
- Disc Overhead



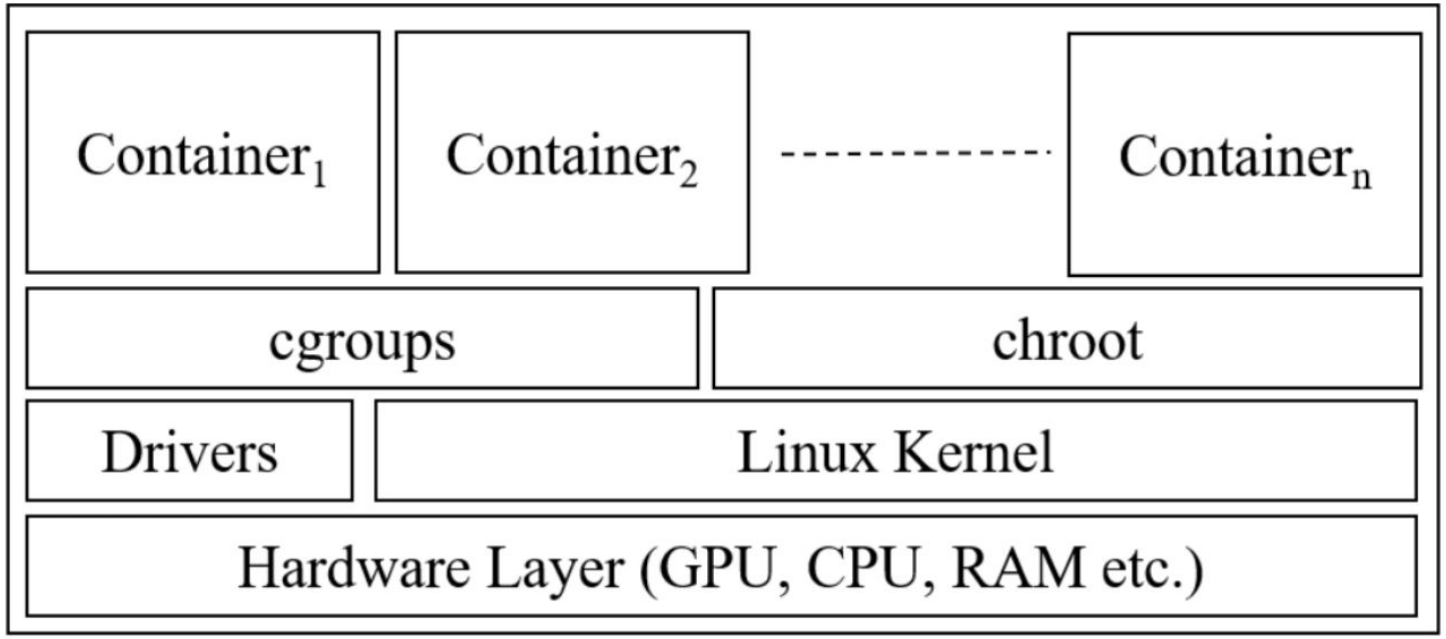
Containers

Advantages:

- Lightweight
  - Storage/Memory
  - CPU
- Performant

Disadvantages:

- Security



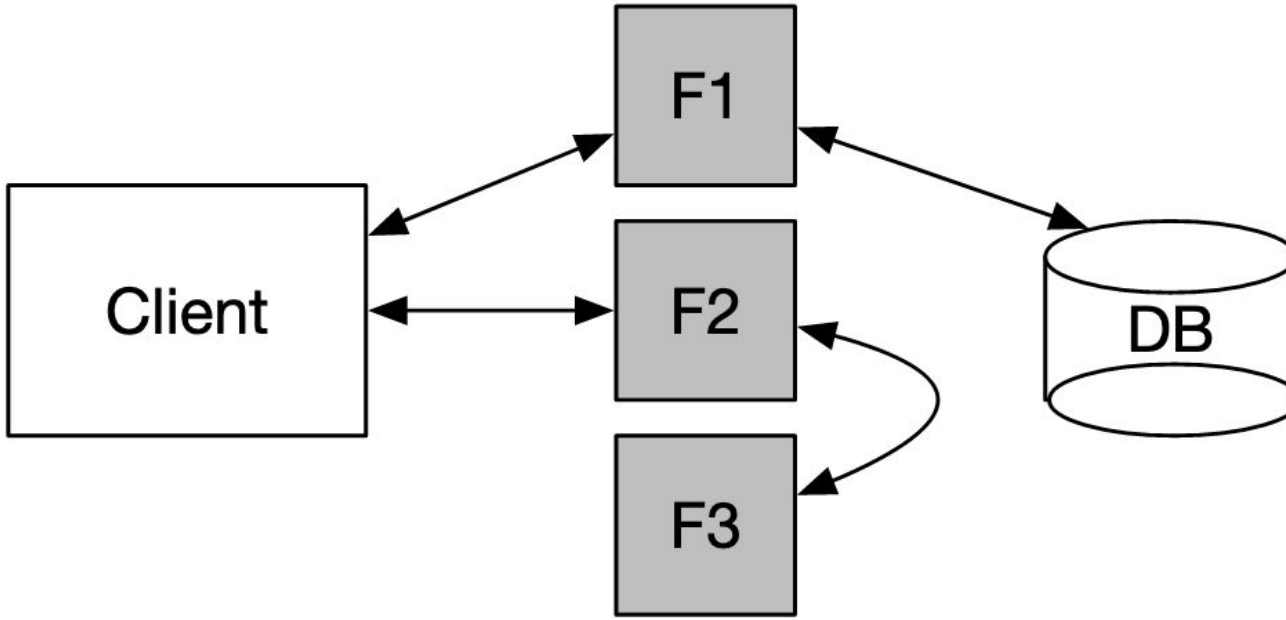
Serverless

Advantages:

- Reduced cost
- Improved utilization of hardware
- Reduced liability, no backend infrastructure to be responsible for.
- Easier operational management
- More scalable than traditional server

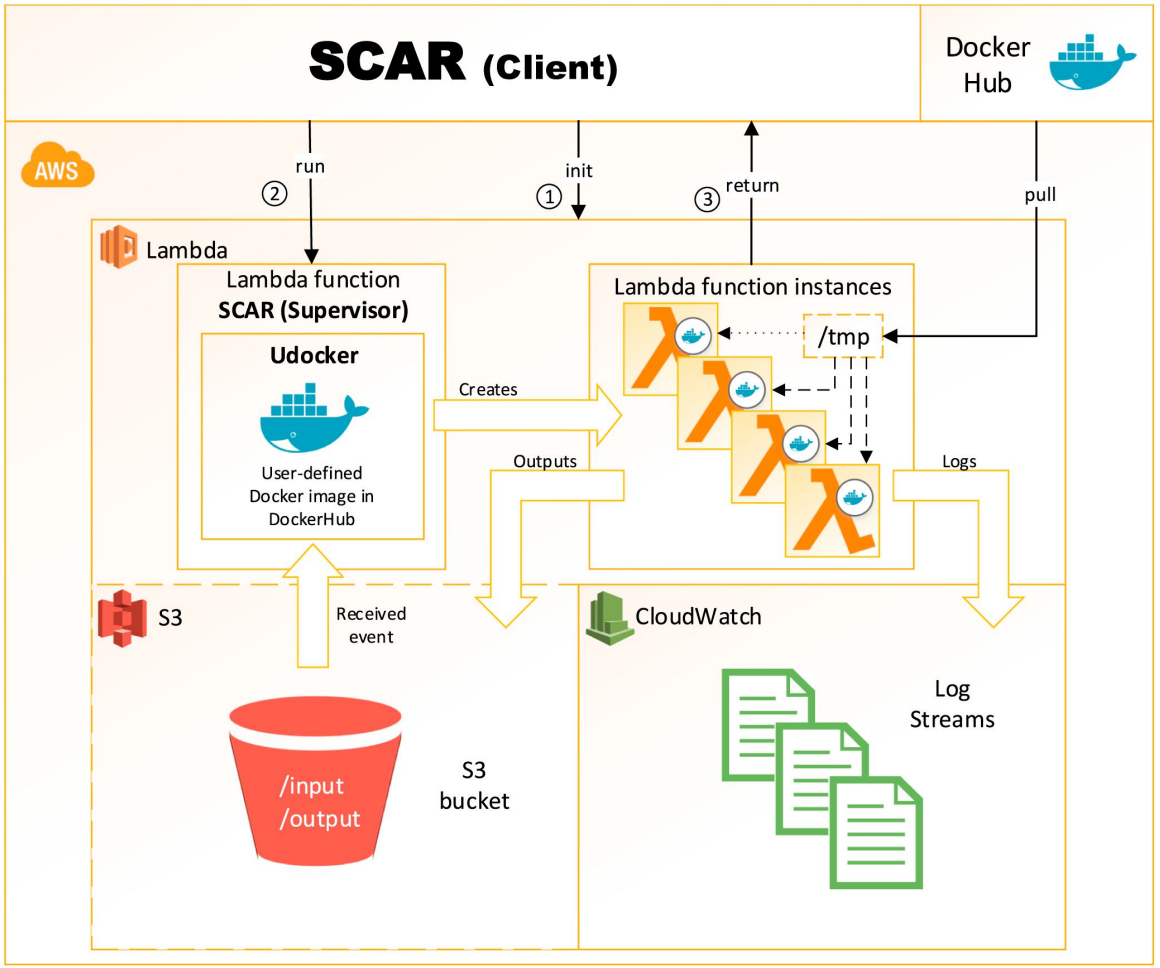
Disadvantages:

- Performance (start & network)
- Persistence Costs
- Complexity



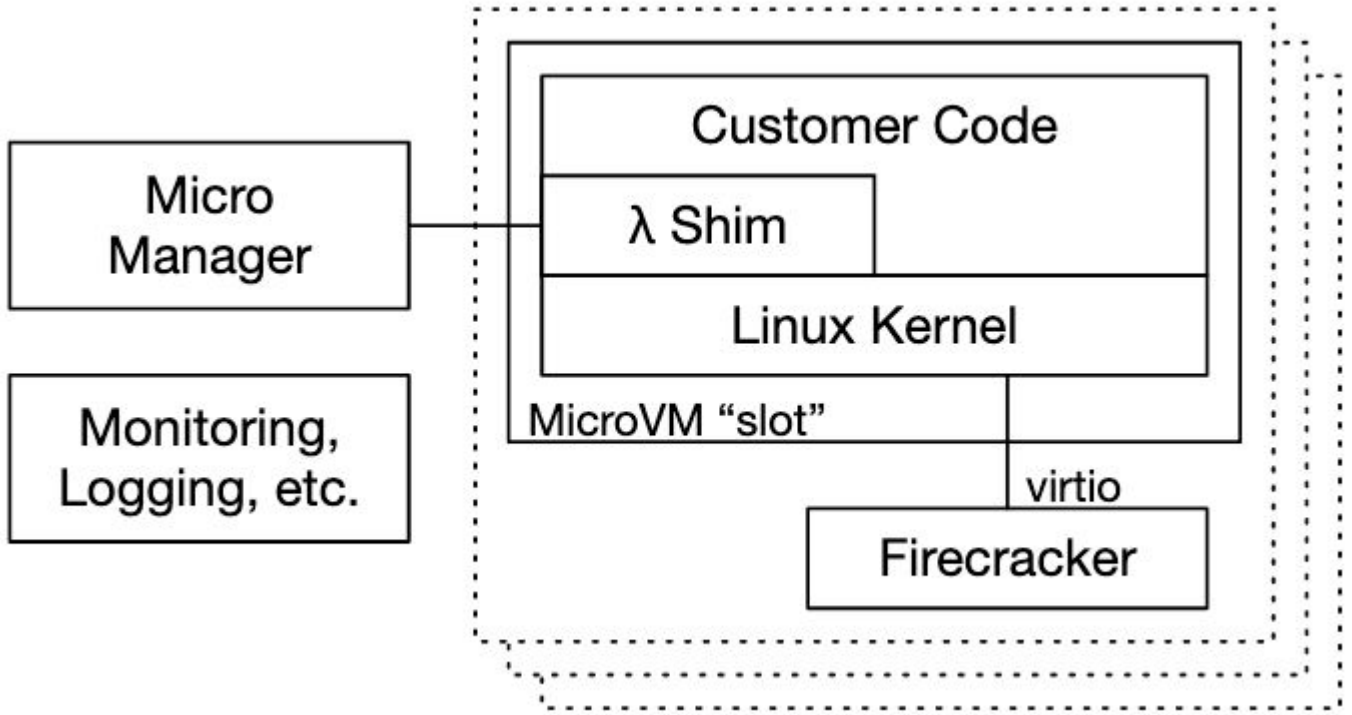
Architectures: SCAR

- Serverless Computing for **Container Aware** Architectures
- Simplifies dependencies and environments
- Outputs to S3 & triggers from S3 events
- Has to fetch and cache container from Docker Hub



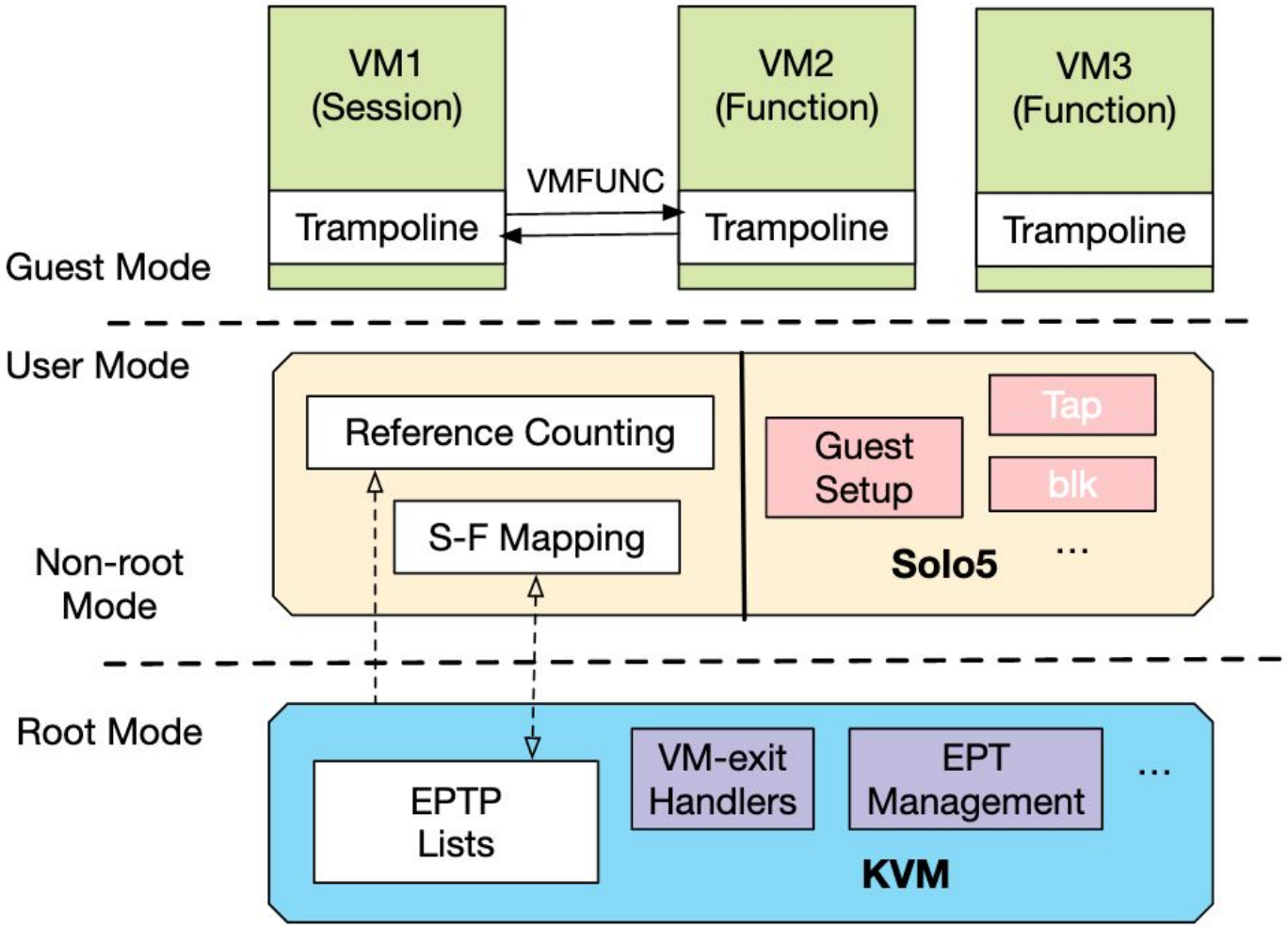
Architectures: Firecracker

- Lightweight MicroVM for AWS lambda
- Better security and isolation
- Low boot times compared to other competing VMs
- Various security layers prevent customer code access outside MicroVM
- Poor performance in high write-throughput situations



Architectures: UaaF

- Unikernel-as-a-Function
- Designed to address startup latency
- Better communication between functions
- Utilizes unikernels that package OS, dependencies, and code together
- VMFUNC allows functions to communicate without VM exits



Demo

Go to demo!

Conclusions

Lambda is a growing and popular deployment framework

- Limitations such as slow startup time, inter-function communication latency, and limited supported languages are barriers
- Functions usually have a limited time they can run
- Long-term storage is an issue

Check out or paper to learn more!!

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Backup Slides

Source: Amazon AWS