Serverless: Beyond the Cloud

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Can we Execute Everything in the Cloud?

✓ Sadly, no!
  ✓ Even in a serverless world, servers exist
  ✓ Cloud computers are still computers

```
root@worker-node1:~# ping 192.169.49.12
PING 192.169.49.12 (192.169.49.12) 56(84) bytes of data.
--- 192.169.49.12 ping statistics ---
  3 packets transmitted, 0 received, 100% packet loss. time 2016ms
```
The “Unfrequented” SW

- Installation hassle
- Probably will sit idle for weeks
- May install unwelcomed dependencies (compromised packages)
- Will occupy disk space (maybe CPU, Mem, ...)
- Removal hassle, (may leave residues)
How About a Different Approach
The Serverless Shell

- Run in Isolation: secure
- Resource Bounded
- Automatic upgrades
- Cross Platform
- Easy to install
- Easy to cleanup

1. **Request received**

2. **SW installed?**
   - **Yes**: Execute command
   - **No**: Perform traditional deployment

3. **Container image exists**
   - **No**: Pass command to container
   - **Yes**: Search registry for existing images of the needed program and run container with received cmd args

4. **Container still running?**
   - **Yes**: Cleanup (when needed)
   - **No**: Continue

**end**
The Serverless Shell Architecture

- Serverless Shell
- Linux Operating System
- Docker engine
- Docker containers
- Image-registry (local or remote)
- Commands to images mapping

Users
Time Analysis

Execution time:
- Command received
- Image loaded
- Command executed

Setup time:
- Command processed
- Container instantiated
Are We Consuming More or Less Resources?

Resource Saving

\[ \varepsilon = (\text{MTBC} - (\text{MTTS} + \text{MTTE})) \]

MTBC: Mean Time Between Calls
MTTS: Mean Time To Setup
MTTE: Mean Time To Execute
How Can Optimize?

Caching!

Pattern Recognition

Temporal

Sequencing
Conclusion

✓ Serverless does not have to be just a Cloud technology

✓ It can be a mindset, that we can apply on any device or platform
Questions?

Are we done installing SW??