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Secure and Scalable Network Packet Processing Using OpenNetVM and mTCP

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Introduction

- OpenNetVM is a software-based NFV platform for scalable and flexible network computing
- Provides a framework for building and connecting network functions in user-space using a kernel bypass method

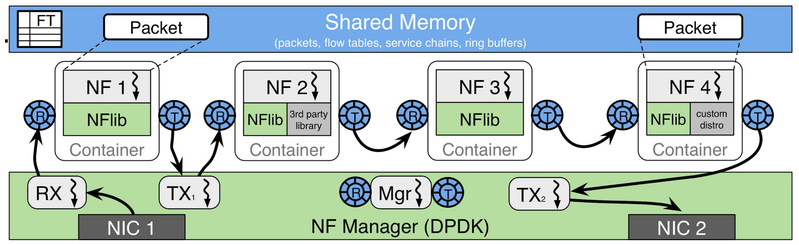
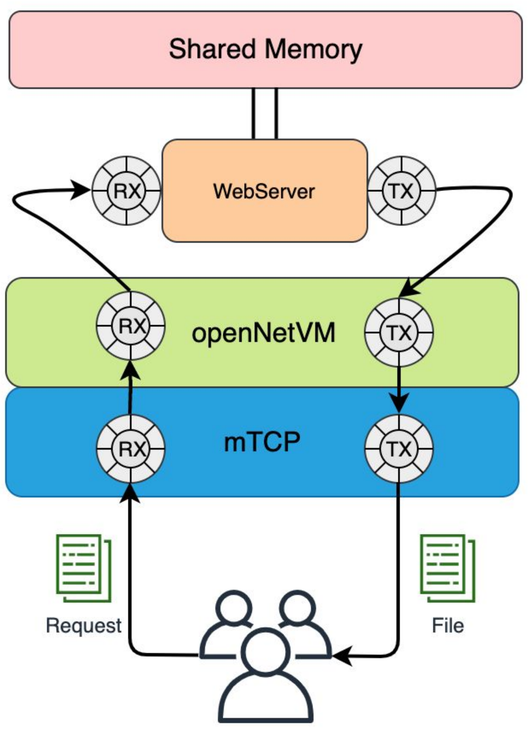


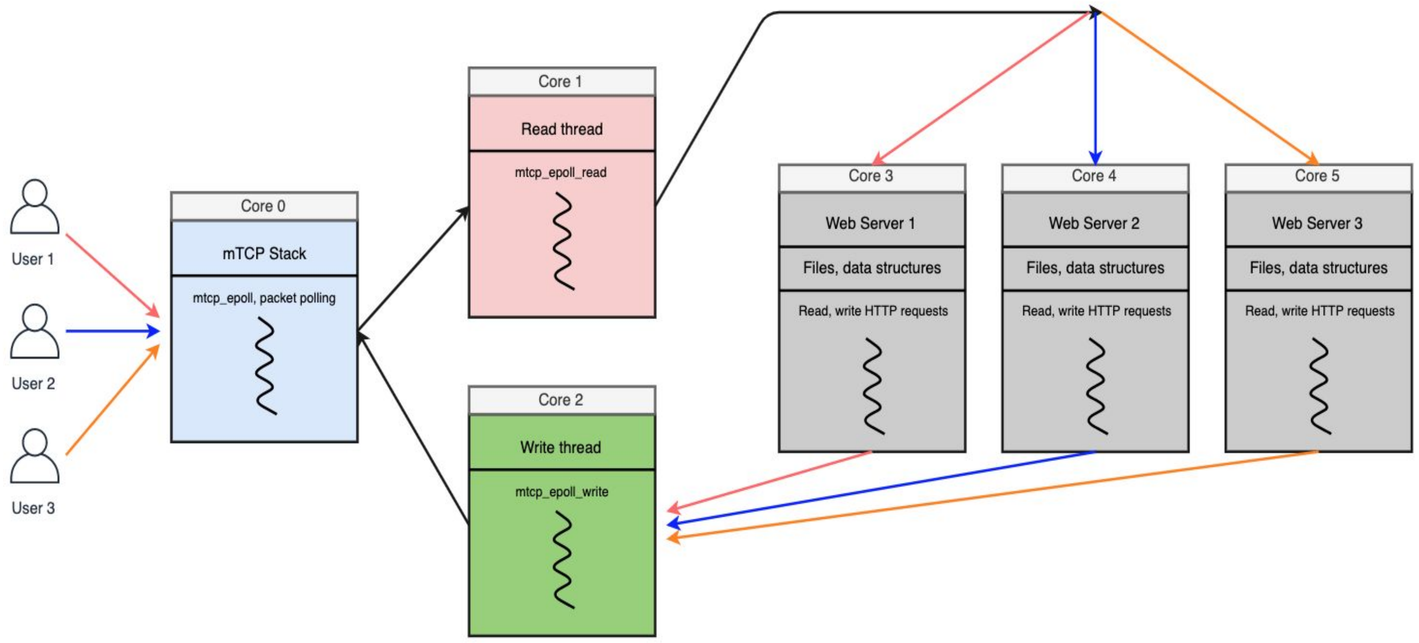
Figure 1, openNetVM architecture

- On its own, openNetVM provides middlebox packet processing
- mTCP is a virtual TCP stack running in user-space that can be combined with openNetVM by running application level processes as network functions

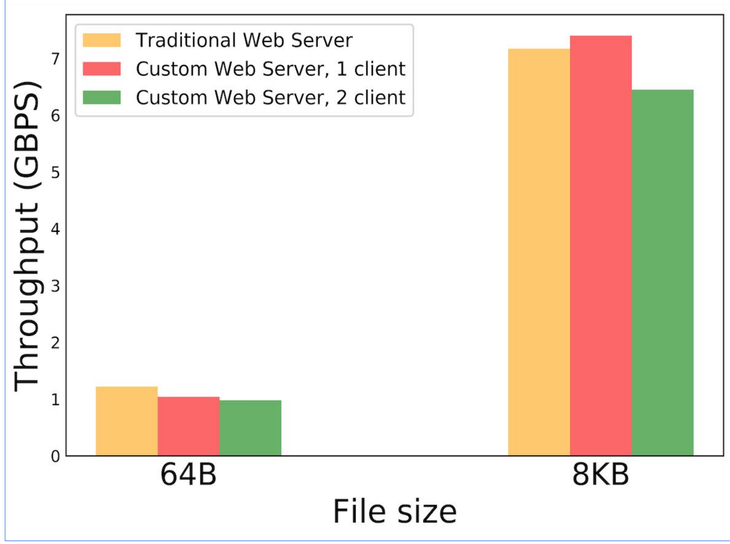


Challenges and Proposed Architecture

- Traditional application level processes running in NFV environment take advantage of shared memory space to obtain high performance
- Centralized processing for applications is poor security practice, as one malicious user may bring down the system, such as a web server
- Solution: Run mTCP applications (i.e, Web Servers) as isolated network functions by splitting up virtualized TCP processing into seperate threads



Results



Conclusion

- Isolating applications as network functions using openNetVM and mTCP retains high throughput
- Proposed architecture provides a secure way for edge cloud services to deploy NFV platforms
- Utilizing the shared core features of openNetVM, this can be extended to support thousands of clients in an isolated fashion

References: mTCP: https://github.com/mtcp-stack/mtcp
openNetVM: https://github.com/sdnfv/openNetVM