

# Linux Plumbers Conference 2024



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## **pwru - Linux kernel and BPF-based networking debugger**

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During our involvement in the development of Cloud Native networking for almost a decade, we learned the hard way that troubleshooting networking problems even in a small environment can turn into a nightmare. Many complexities stem from the Linux kernel itself - sending a packet involves dozens of kernel functions from different subsystems. Traditional tools such as tcpdump fall short, as they are often not fine-grained enough.

Our debugging frustration led to the creation of an eBPF-based networking debugging tool “pwru” (“packet, where are you?”). In the beginning, it only targeted the host networking stack. However, with the advent of eBPF-based networking more and more host networking functionality has been moved to BPF programs. Therefore, we started to extend the tool to support BPF program tracing.

First, in this talk, we will present the debugger’s implementation. Next, we will talk about some limitations of the BPF subsystems we had to work around when extending the debugger. Finally, we will present a few interesting networking problems debugged with the tool.

**Primary authors:** LIANG, Gray (Isovalent at Cisco); PUMPUTIS, Martynas (Isovalent at Cisco)

**Presenters:** LIANG, Gray (Isovalent at Cisco); PUMPUTIS, Martynas (Isovalent at Cisco)

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