

XDP hands-on tutorial

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Outline

Introduction – what is XDP and who are we?

About this tutorial – plan for today

Bonus tasks



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What is XDP?

XDP basically: **New layer in the kernel network stack**

- Before allocating the SKB
- Driver level hook at DMA level

Means: Competing at the same “layer” as DPDK / netmap

- Super fast, due to
 - Take action/decision earlier (e.g. skip some network layers)
 - No memory allocations

Not kernel bypass; data-plane is kept inside the kernel

- Via eBPF: makes early network stack **run-time programmable**
- Cooperates with the kernel stack



We are the “network vikings” (apparently)



Mostly, we work on XDP upstream: <https://github.com/xdp-project/xdp-project>



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About this tutorial

This tutorial is meant as a living document, developed on Github:

<https://github.com/xdp-project/xdp-tutorial>

This session is the **beta test** of the live version.

- Please send feedback; or even better, pull requests!



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Plan for today's session

- This introduction
- You each go through the tutorial in the git repo
- We will help answer questions
- Follow-ups every ~half hour



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Structure of the tutorial

Comprised of seven topical **lessons**, in the numbered directories in the git repo.

We recommend you complete them in this order:

- basic01-xdp-pass
- basic02-prog-by-name
- basic03-map-counter
- basic04-pinning-maps
- packet01-parsing
- packet02-rewriting
- packet03-redirecting

Read the **README.org** file in each directory to get started.



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The test environment helper script

The `testenv` directory contains a helper script to setup a test environment.

- Uses network namespaces and virtual network devices to simulate a real setup
- Requires kernel version **4.19 or higher**
 - Due to `veth` driver getting native-XDP support (incl. fixes)
 - Preferred kernel is **4.20** as `veth` got `ethtool` statistics
- See `README.org` in the `testenv` directory for instructions
- Easy alias: `eval $(./testenv alias), then t setup`



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Namespaces and virtual ethernet devices

- The testenv script uses **network namespaces** and **virtual ethernet devices** to simulate a real environment.

```
+-----+
| Root namespace |
|               |
|               | From 'test01'
|               |
|               | TX->
|               |
| test01 +-----+
|               |
|               | <-RX
|               |
|               | From 'veth0'
|               |
+-----+

+-----+
| Testenv namespace 'test01' |
|                             |
|                             |
|                             | RX->
| veth0 +-----+
|
| <-TX
|
+-----+
```

- XDP programs are installed on the **test01** interface in root namespace
- Generate traffic from **inside** the namespace

Bonus tasks

As we said, this is a **beta test**. So some of you may **finish all tasks** before we run out of time.

Here are some suggestions for extra tasks:

- Improve the tutorial and send a pull request
- Implement your own use case and test it (we'll help!)
- Write a blog post about your experience with XDP



Getting started

```
$ git clone https://github.com/xdp-project/xdp-tutorial
$ cd xdp-tutorial
$ git submodule update --init
$ less README.org
```



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