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Network programmability with HIKe and eCLAT

GIORNATA DI INCONTRO
BORSE DI STUDIO GARR
"ORIO CARLINI"
ROMA
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Università degli studi di Tor Vergata - Dipartimento di ingegneria elettronica

Setting up the scene - Network programmability

- Network programmability (dataplane programmability)

- Micro-programmability

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So what?

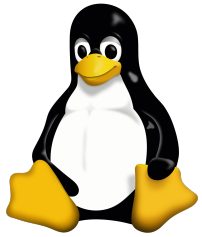
Reaction to sudden changes!

Think about new ways for the network to operate!

Our take - eBPF/XDP dataplane on Linux

XDP - *eXpress Data Path*
eBPF - extended Berkeley Packet Filter

- eBPF is a virtual machine abstraction and a programming language that can be executed inside the Linux kernel



- XDP uses eBPF to define packet processing operations that are executed very "early", as soon as the packet is received from the NIC

→ **very efficient!!**

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eBPF/XDP limitations

- eBPF/XDP is great for performance, but…
  - eBPF programming requires deep technical skills (and it is very painful also for the experts!!)
  - eBPF/XDP does not provide good programming abstractions/simplifications for "composing" eBPF programs
- ***We need a better model !! "easy and accessible to everyone"***

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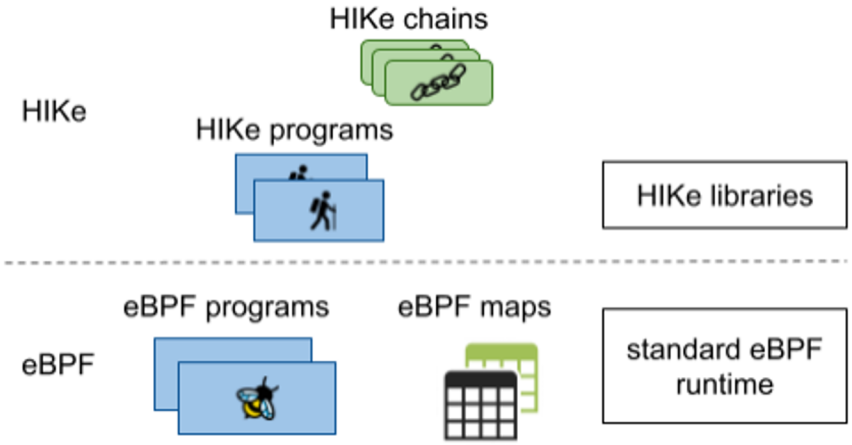
HIKe and eCLAT: two solutions for the complexity

1) HIKe - HybrId Kernel/eBPF data plane

HIKe is a programmable data plane architecture:

- dynamic composability of eBPF programs into "chains"
- support of "chain-in-chain" calls for reusability
- abstraction of an execution environment



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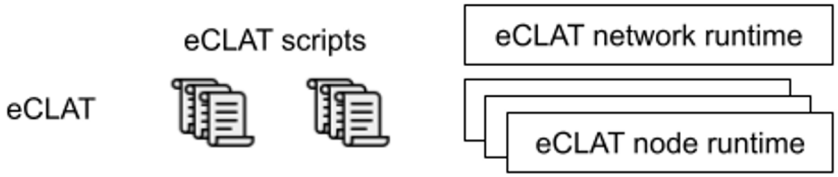
HIKe and eCLAT: two solutions for the complexity

2) eCLAT - eBPF Chains Language And Toolset

eCLAT provides a high-level programming abstraction to HIKe

- support of network-wide operations (chaining and deployment)
- from node programmability to network programmability



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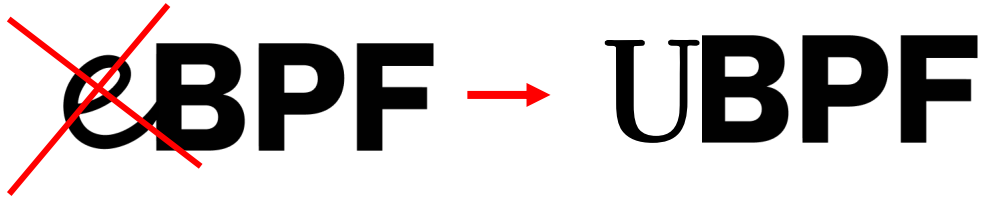
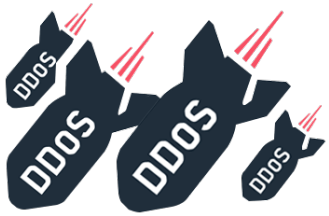
My goals

1. contribute to the design, development and comparison of HIKe and eCLAT network programmability frameworks based on eBPF



2. focus on network programmability applications to network monitoring, to the identification of network and traffic anomalies and to dynamic reaction/mitigation of DDoS.



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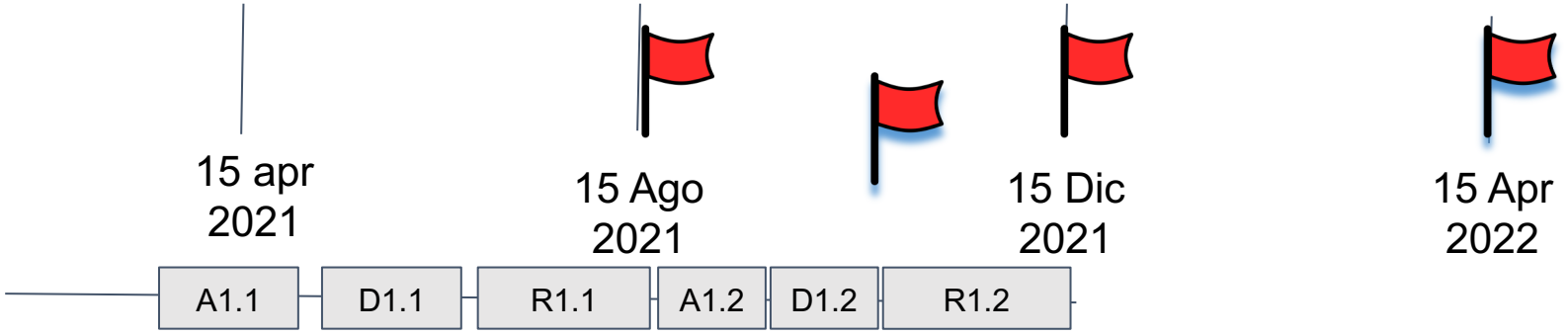
Time program, expected results, interaction with GARR



1. Design and comparison of network programmability frameworks

2. Applications to network monitoring, identification of anomalies, dynamic reaction

A : Analysis
D : Design
R : development and Release

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Thanks for your attention!

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