A Network in a Laptop: Rapid Prototyping for Software-Defined Networks

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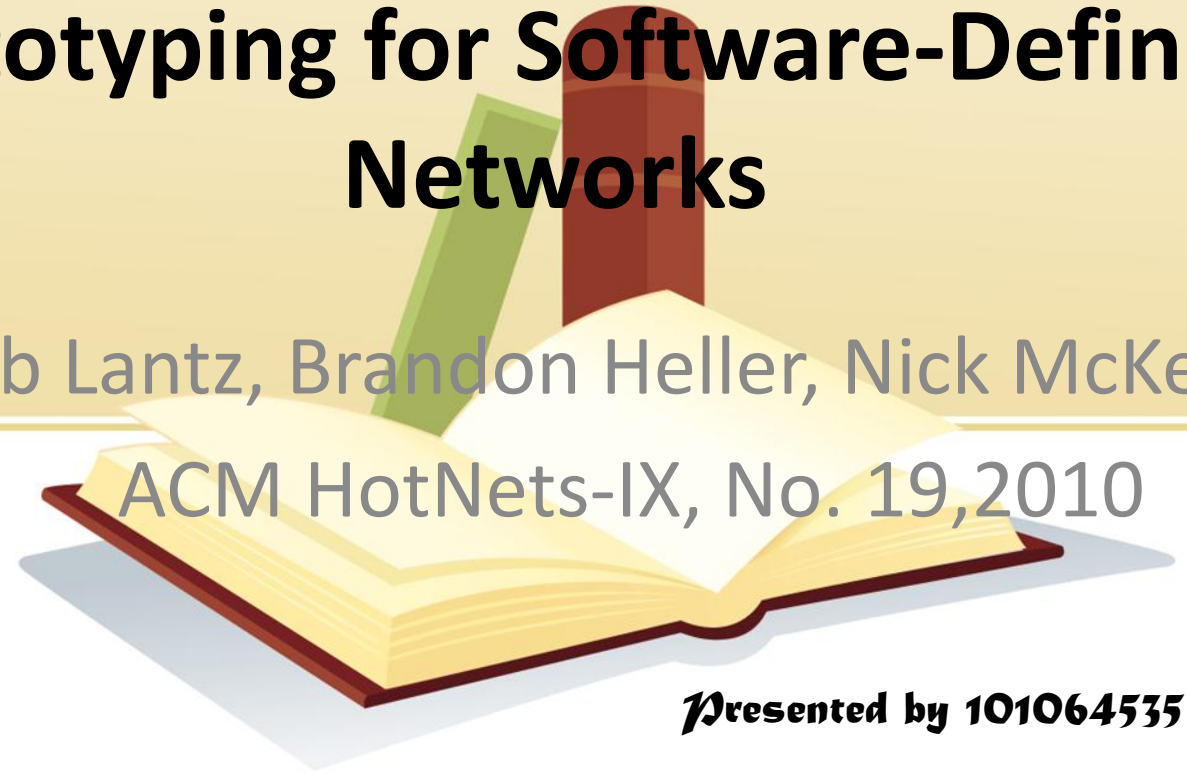


Presented by 101064535 鄭如意

Software-Defined Network

Motivation

Paper deadline approaching

No hardware

Motivation

Same code can't be deployed in real network

OPNET®
Making Networks and Applications Perform™

NS2

MININET

Real network

Motivation

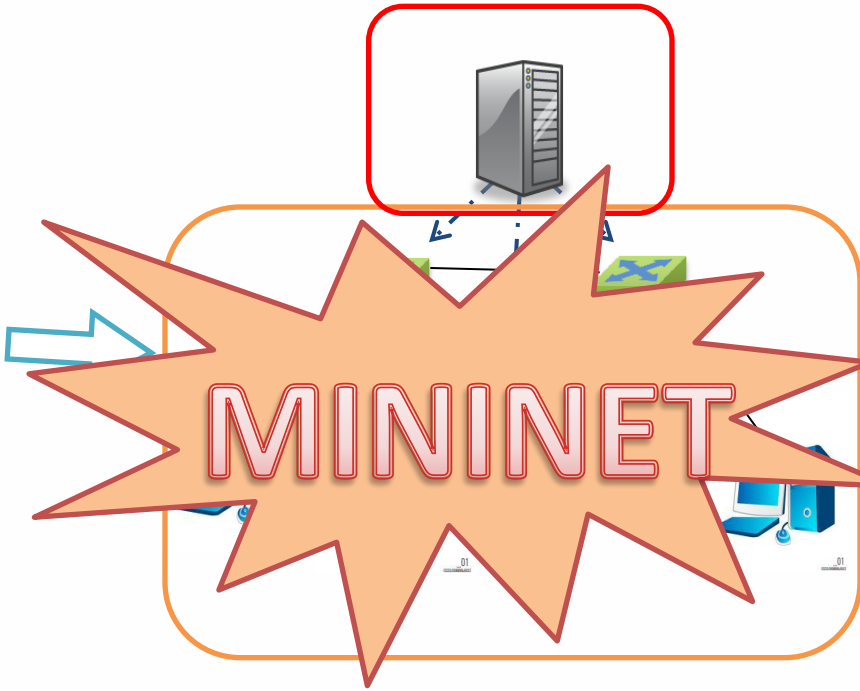
VMs are too heavy weights

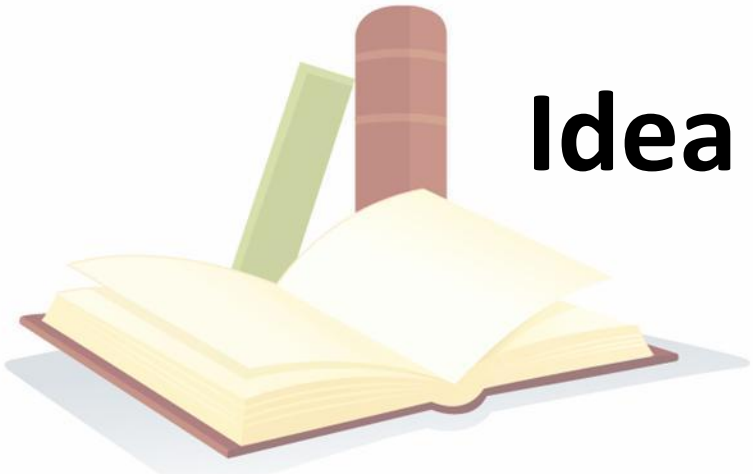
VM

VM switch

⋮

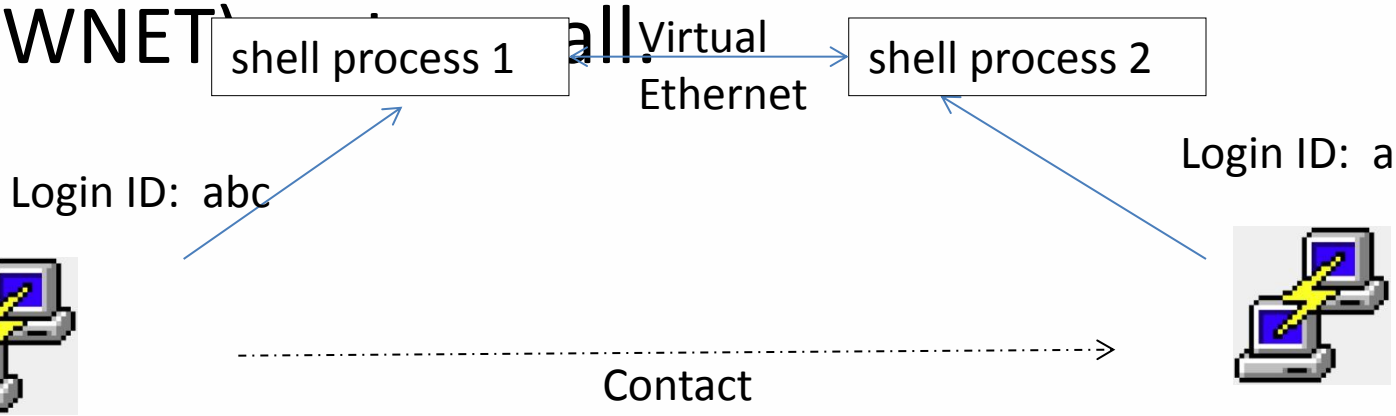
VM host



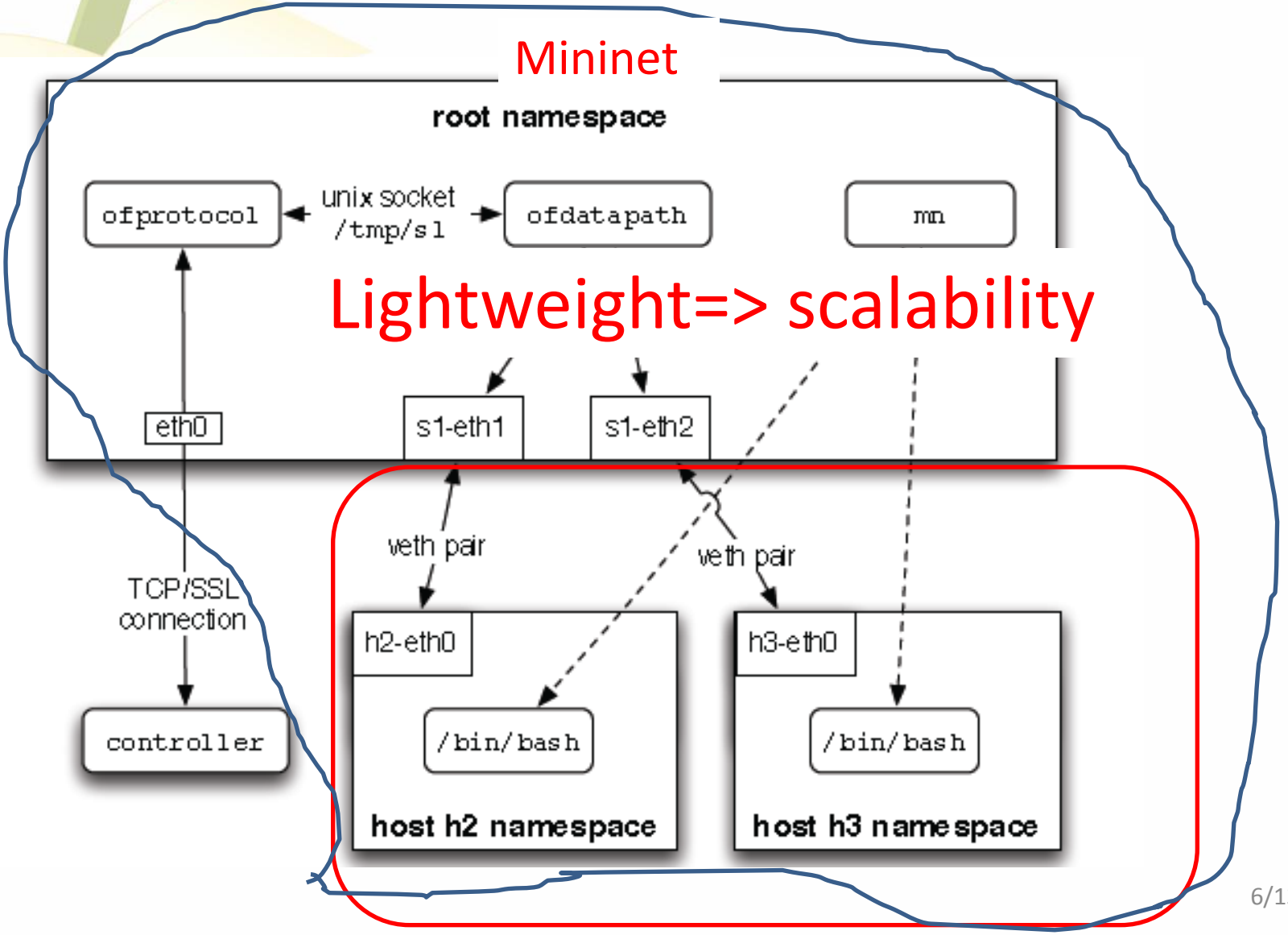


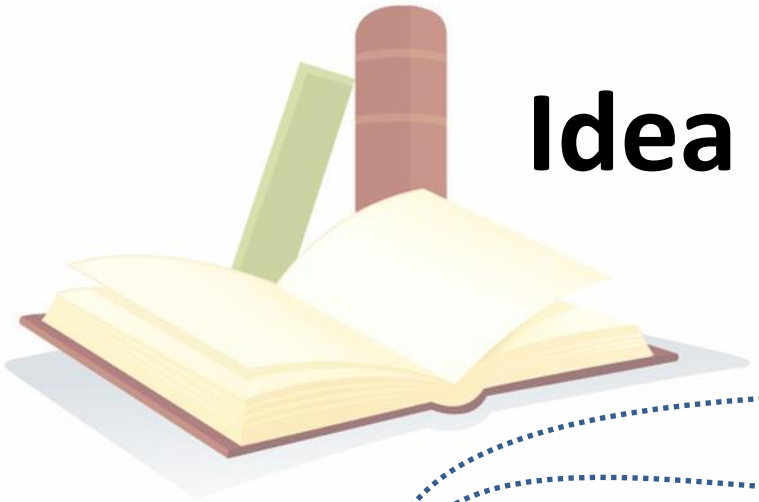
Idea of Mininet

- Environment: Linux
- Hosts: A host in Mininet is simply a shell process (e.g. bash) m into its own network namespace w the unshare(CLONE NEWNET) all.



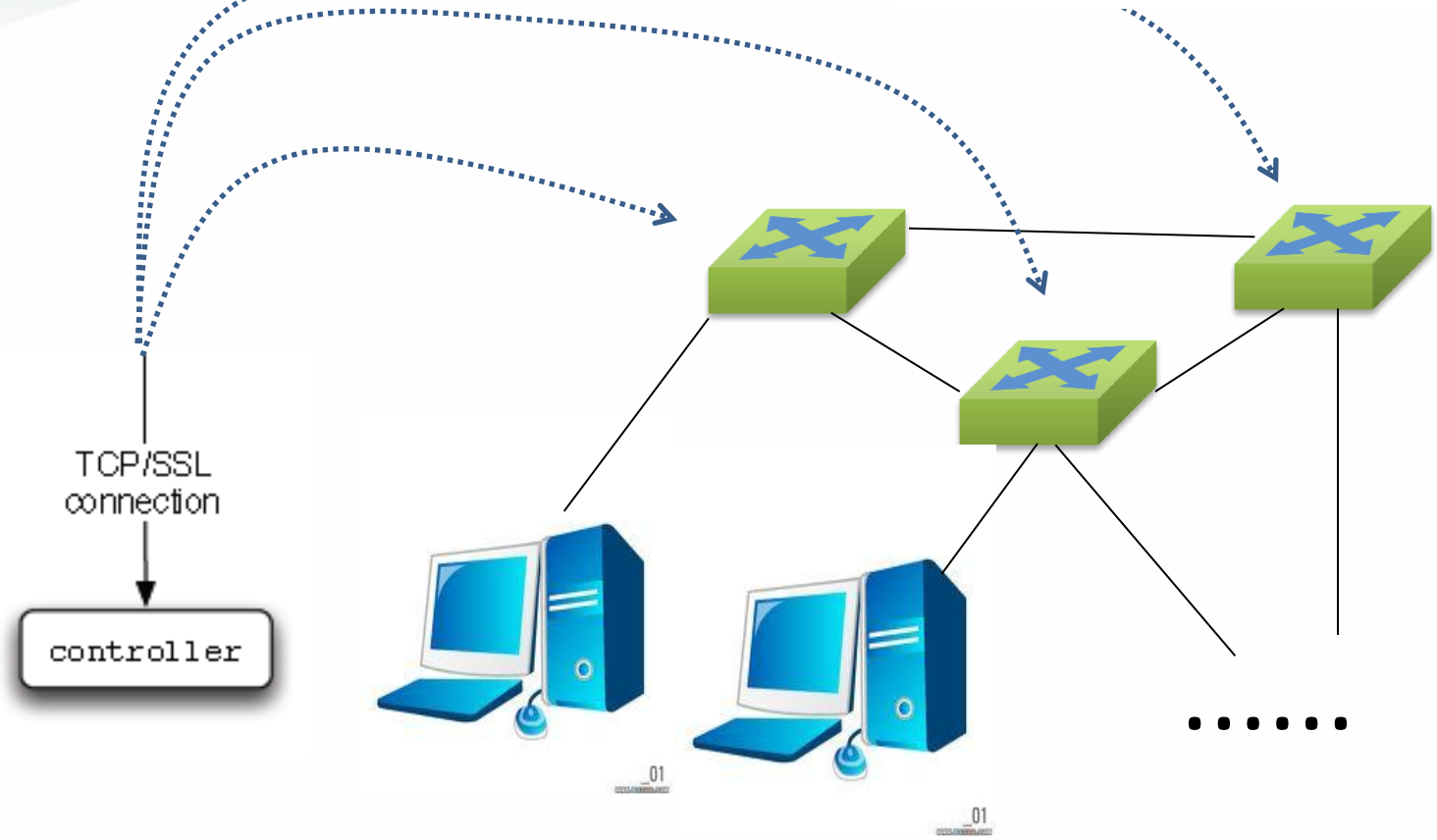
Idea of Mininet





Idea of Mininet

Deployment



Mininet workflow

Step 3: Control the behavior between hosts

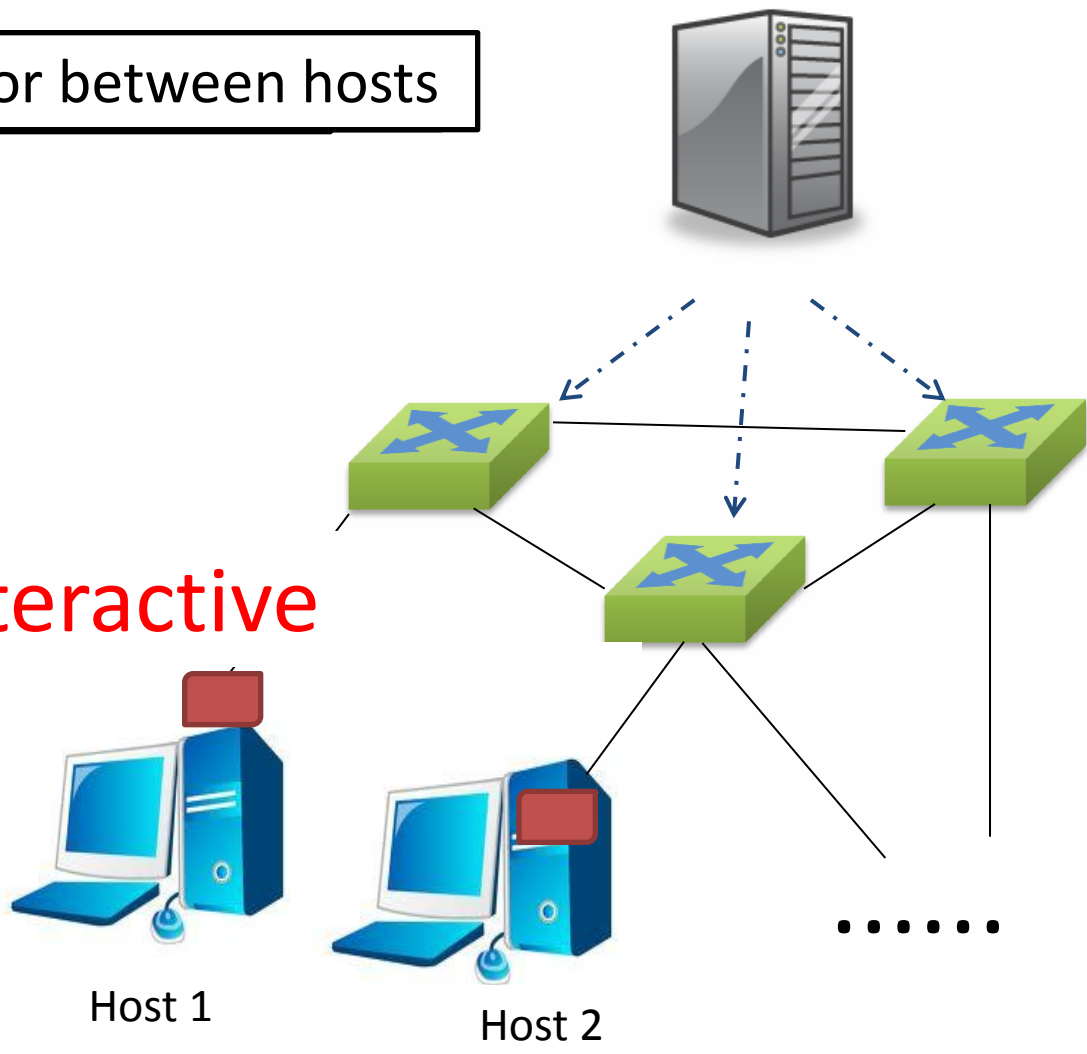
Command line

mininet> Host 2 ping Host 1

API-- MiniEdit

Python API for define some script

Interactive



Monitor Interface

Performance

S (Switches)	User(Mbps)	Kernel(Mbps)
1	445	2120
10	49.9	940
20	25.7	573
40	12.6	315
60	6.2	267
80	4.15	217
100	2.96	167

Performance

Topology	Host	switch	Setup(s)	Stop(s)	Mem(MB)
Minimal	2	1	1.0	0.5	6
Linear(100)	100	100	70.7	70.0	112
VL2(4, 4)	80	10	31.7	14.9	73
FatTree(4)	16	20	17.2	22.3	66
FatTree(6)	54	45	54.3	56.3	102
Mesh(10, 10)	40	100	82.3	92.9	152
Tree(4^4)	256	85	168.4	83.9	233
Tree(16^2)	256	17	139.8	39.3	212
Tree(32^2)	1024	33	817.8	163.6	492

Attribute of Mininet

- Advantage:
  - Interactive
  - Sharing
  - Deployment
- Disadvantage:
  - O(n) linear lookup for software tables
  - Host cannot be migrated live like VMs.

Conculsion

- Mininet is a system for rapidly prototyping large network on the constrained resources of a single laptop.
- http://mininet.org/