



EPI Framework: A dynamic infrastructure to support health applications

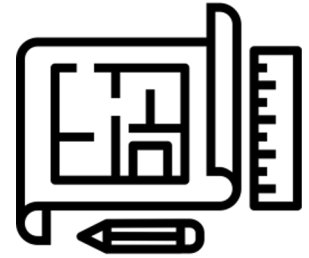
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Daily supervisor: Dr. Paola Grosso
Co-supervisor: Dr. Axel Berg
Promotors: Prof. Dr. Cees de Laat
Prof. Dr. Anwar Osseyran



Since our last meeting

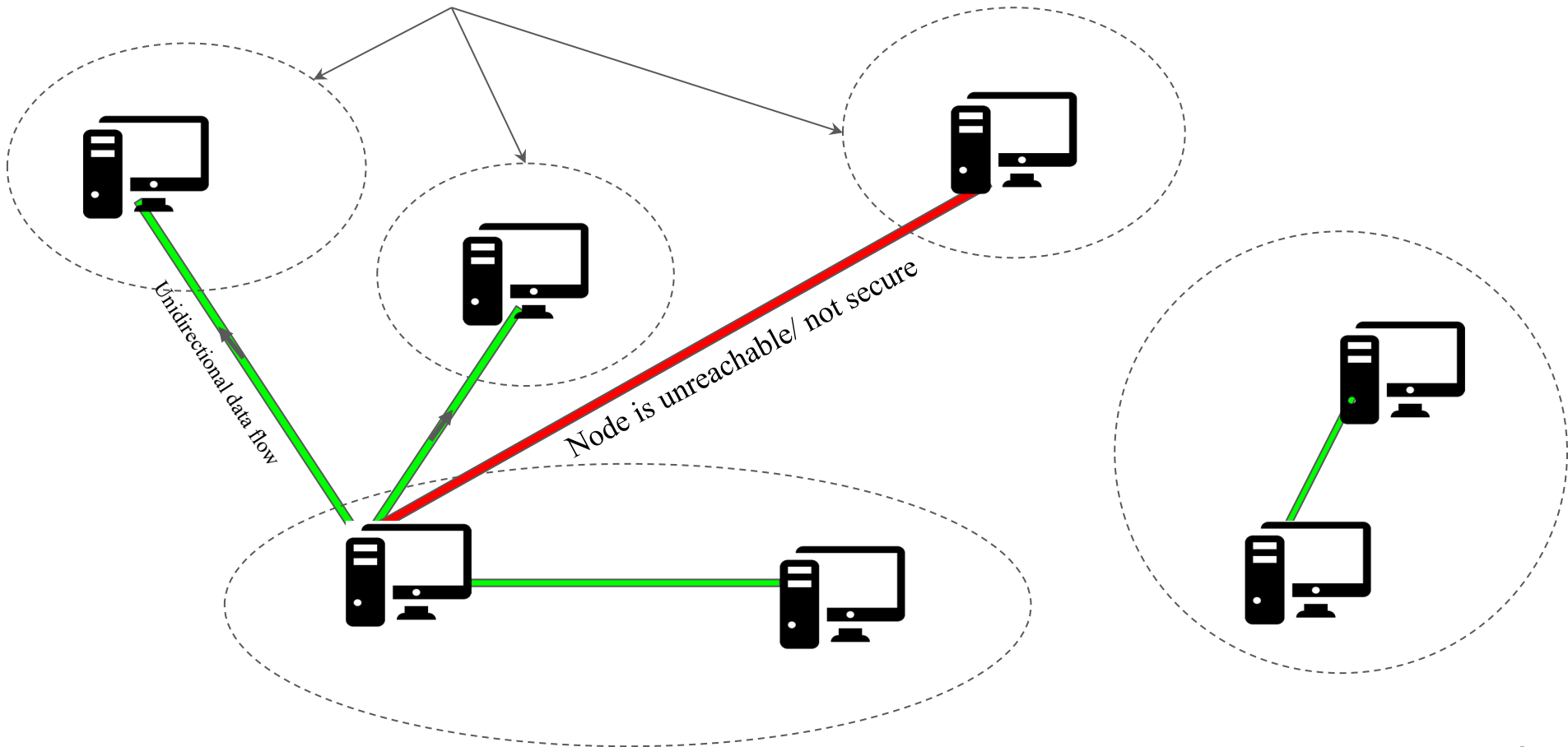


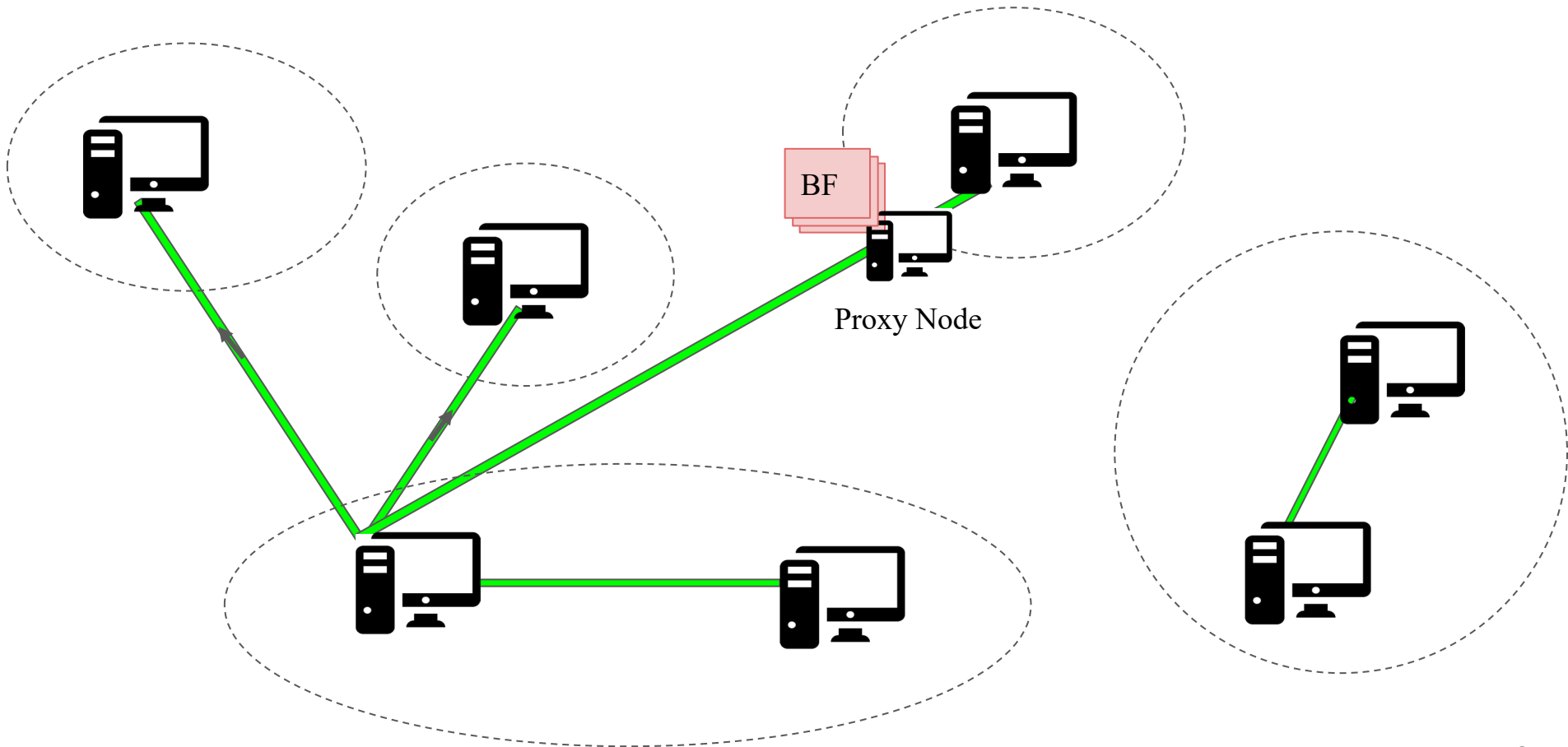
- Collaboration with BRANE to implement the framework
- Implementing a EPIF functionality
 - Redirection tools
 - Benchmarking
 - Evaluating different parameters
- Paper submitted to eScience2021
- Experiment plan
 - More on redirection tools
 - Chaining BF
- 3 Students supervision

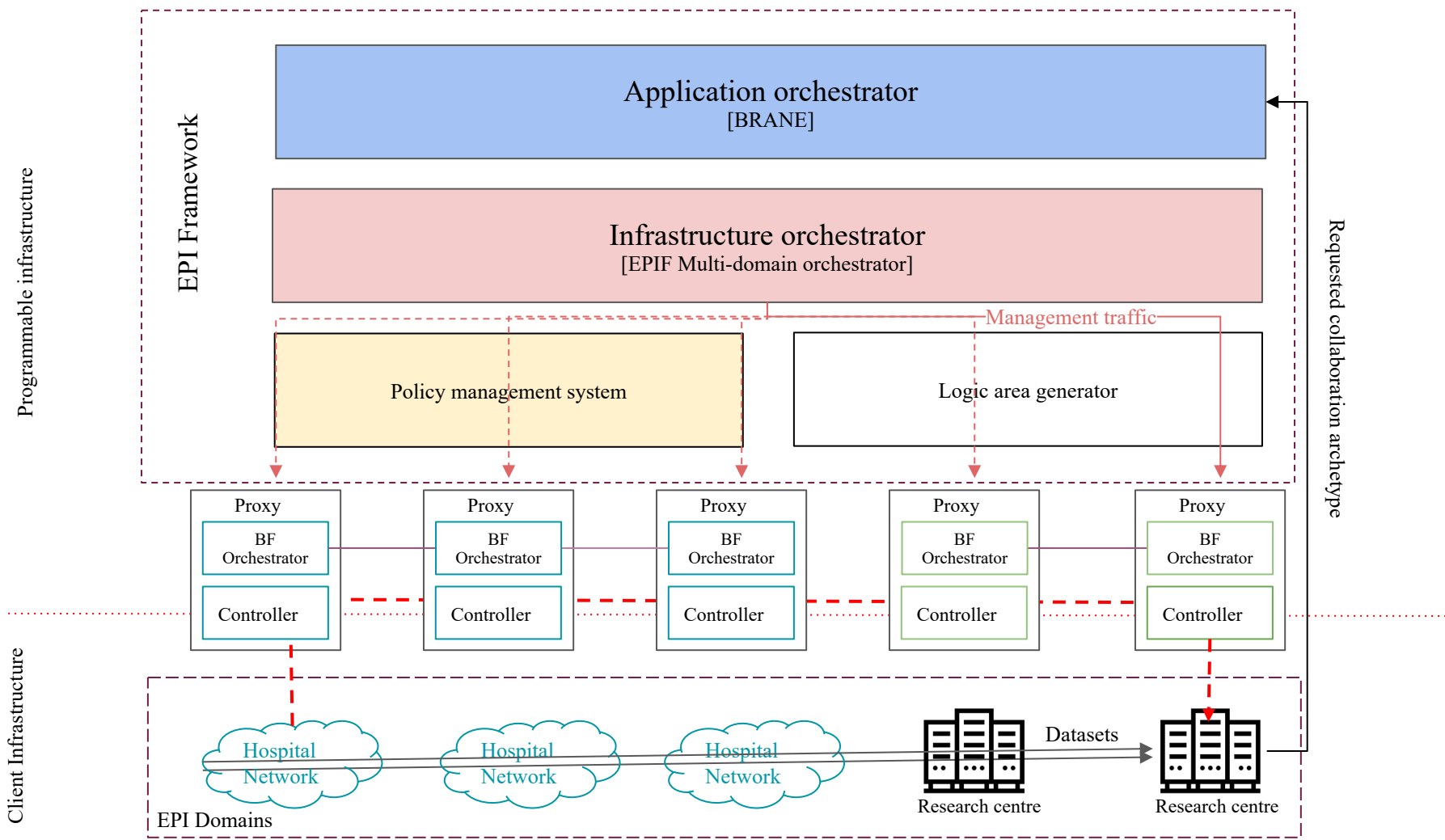


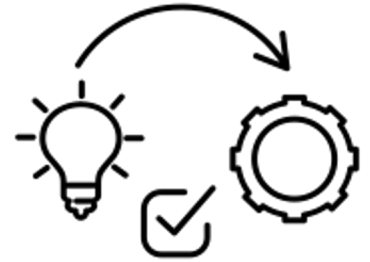
EPIF: The Architecture

Security areas created across multi-domains



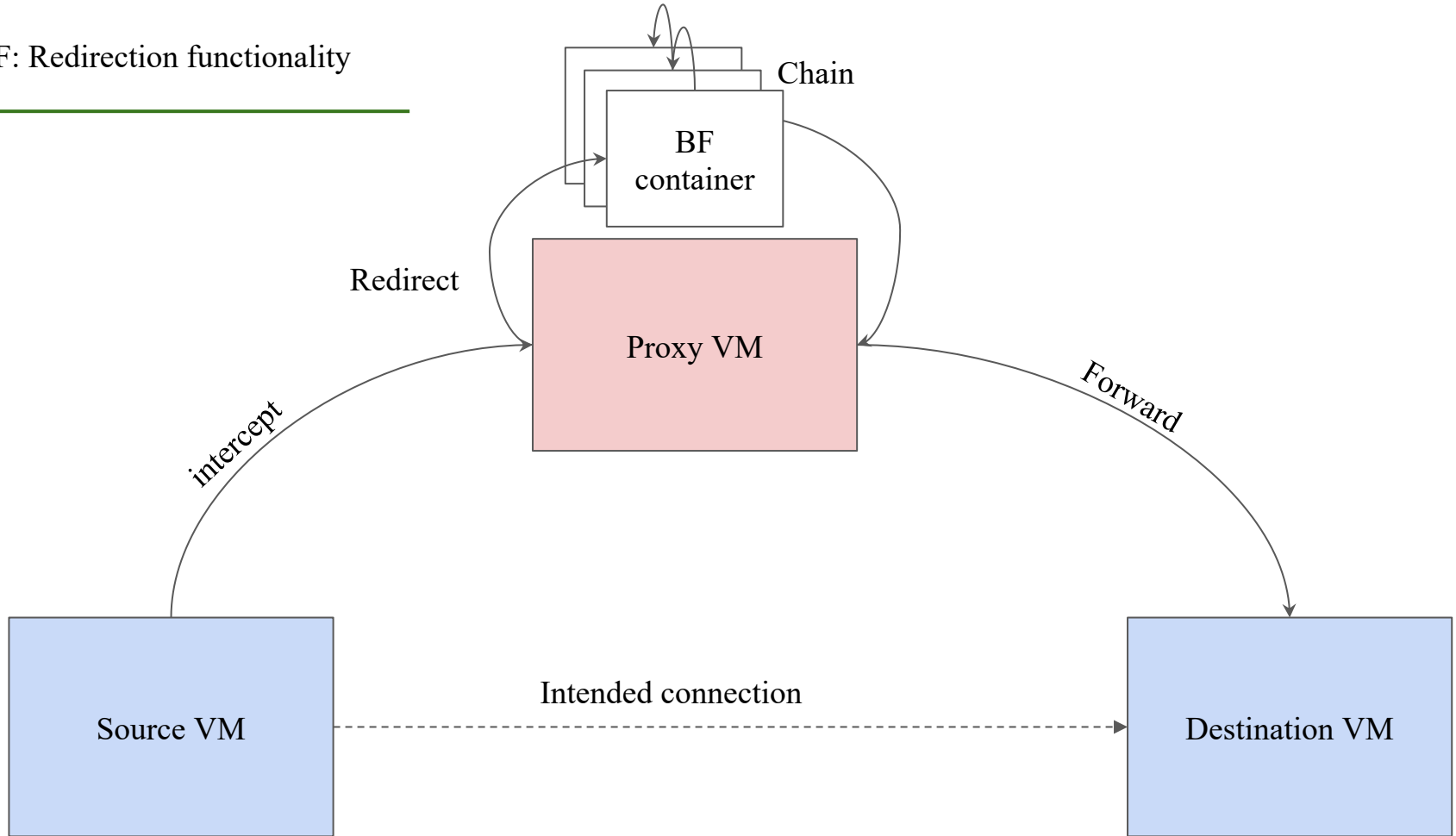




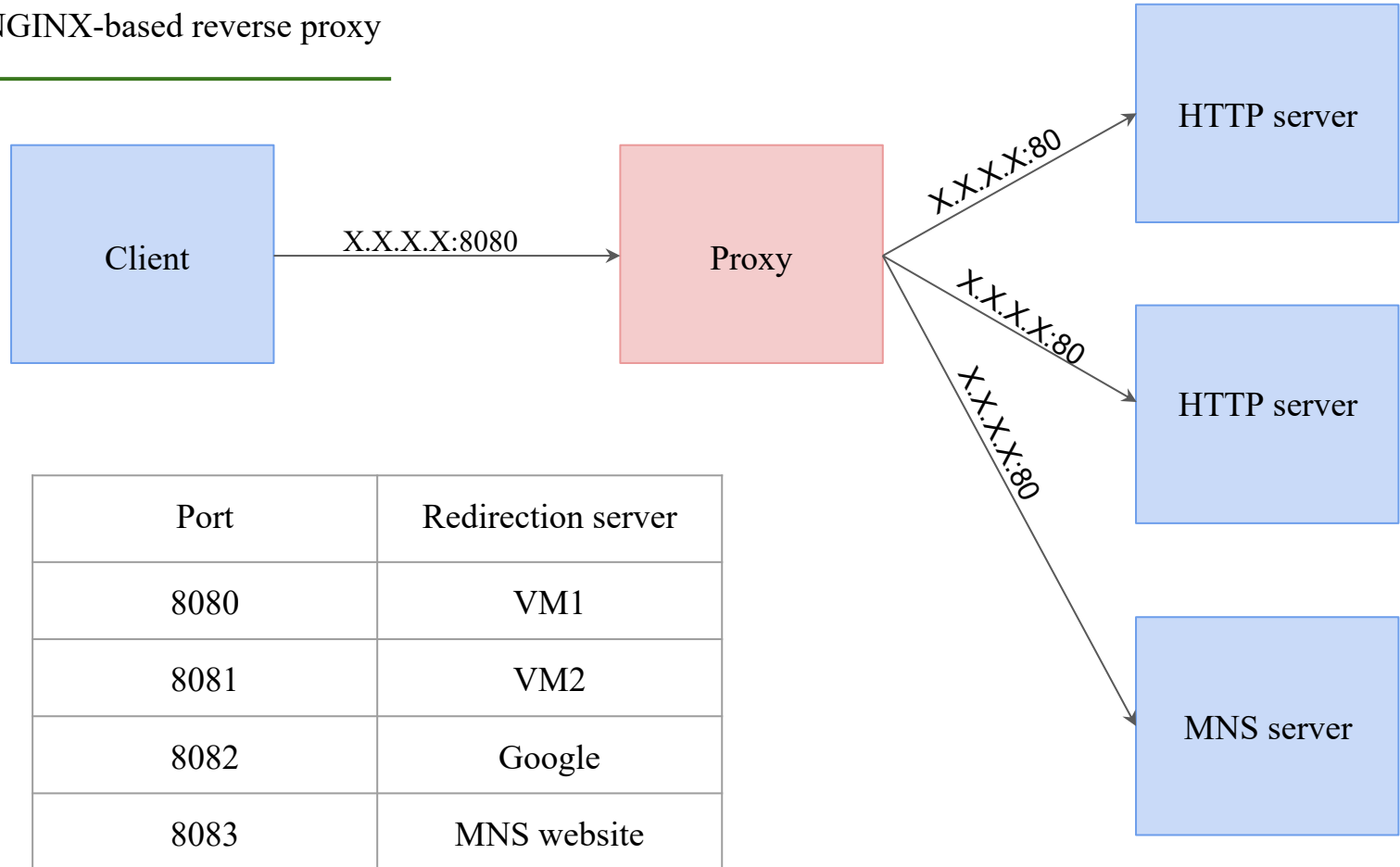


Proxy Implementations

EPIF: Redirection functionality

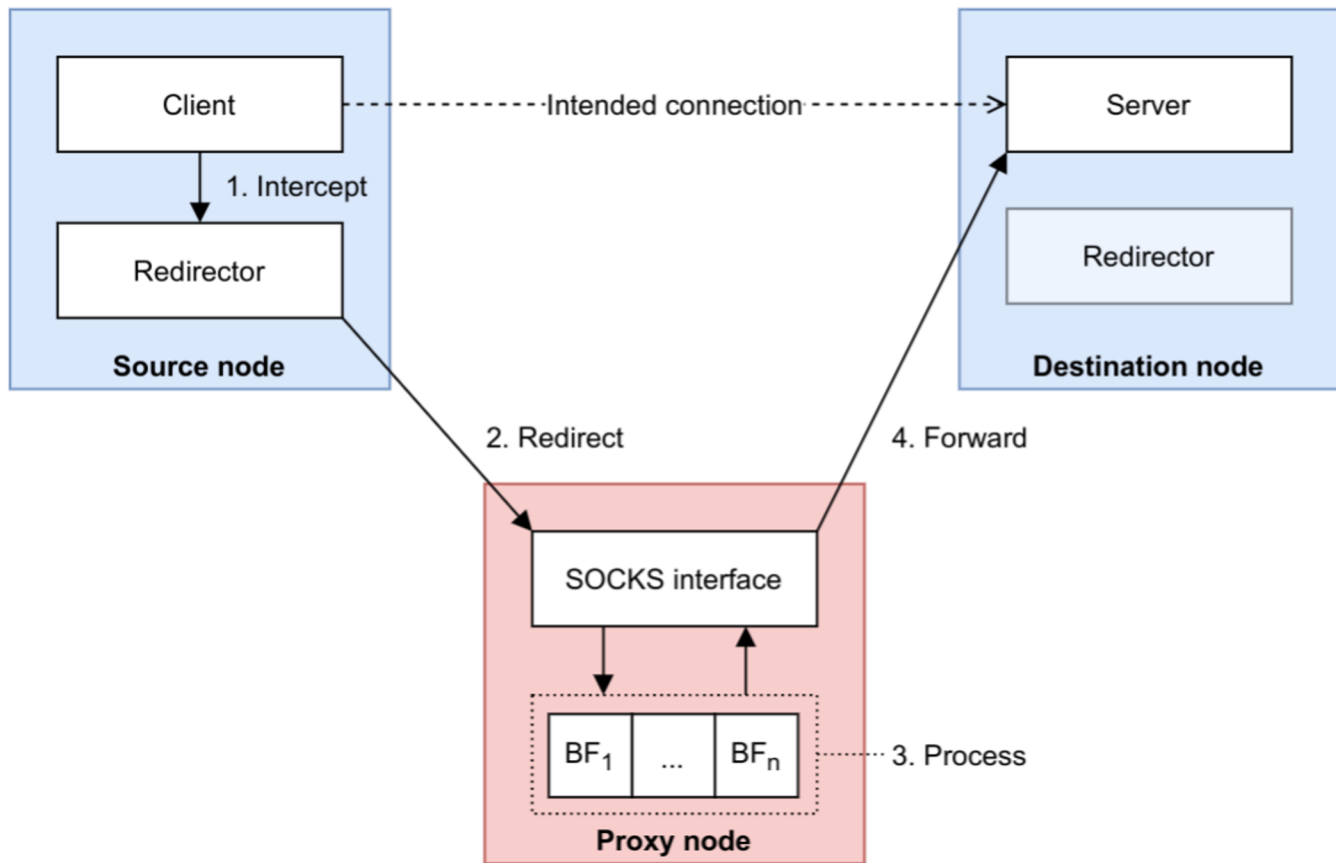


1. NGINX-based reverse proxy



2.

SOCKS-based proxy



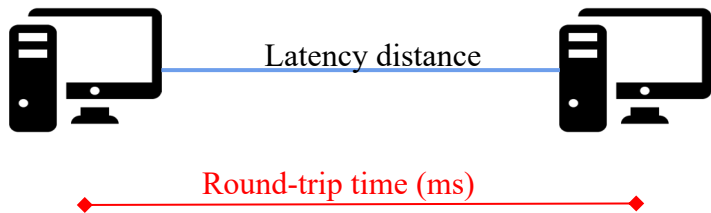


Experiments and results

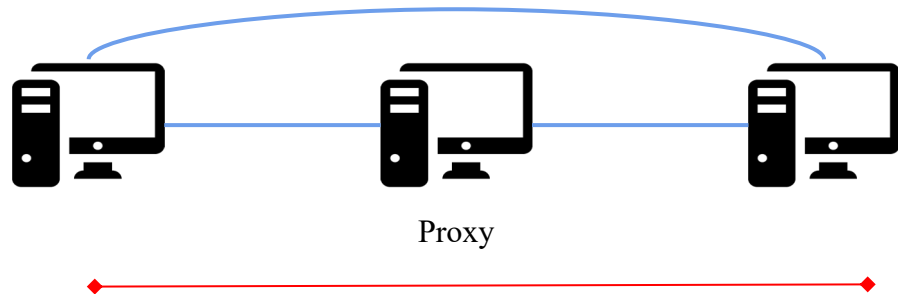
Experiments

- To determine which implementation should be adopted
- We benchmark the two approaches:
 - time overhead
 - rate of processed transactions
- Fully containerise and automate the benchmark setup
- <https://github.com/epi-project/proxy-bench>
- Implement three applications:
 - Client
 - Server
 - Proxy
- Network tools:
 - httping
 - wrk

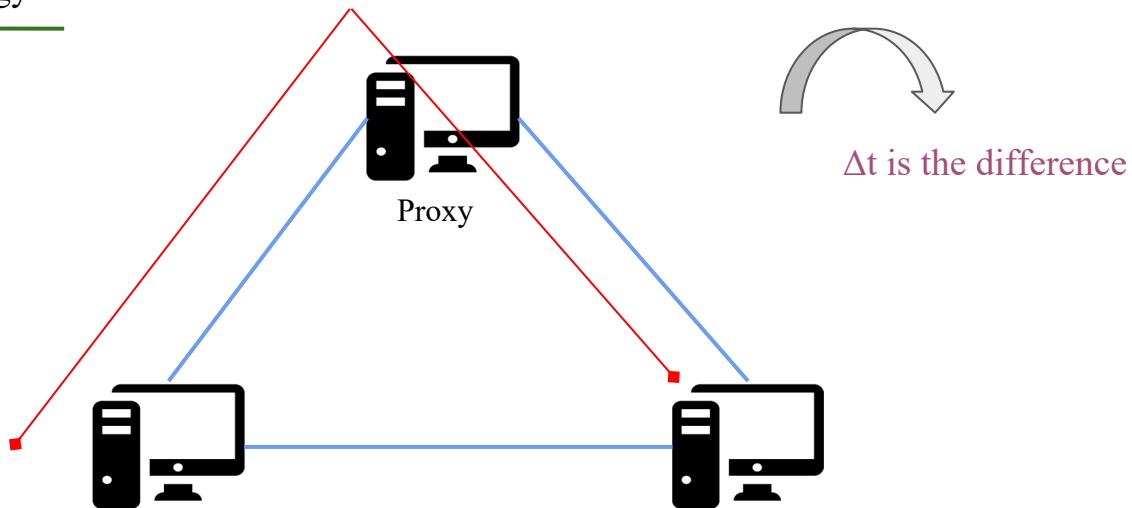
The baseline no-proxy topology:



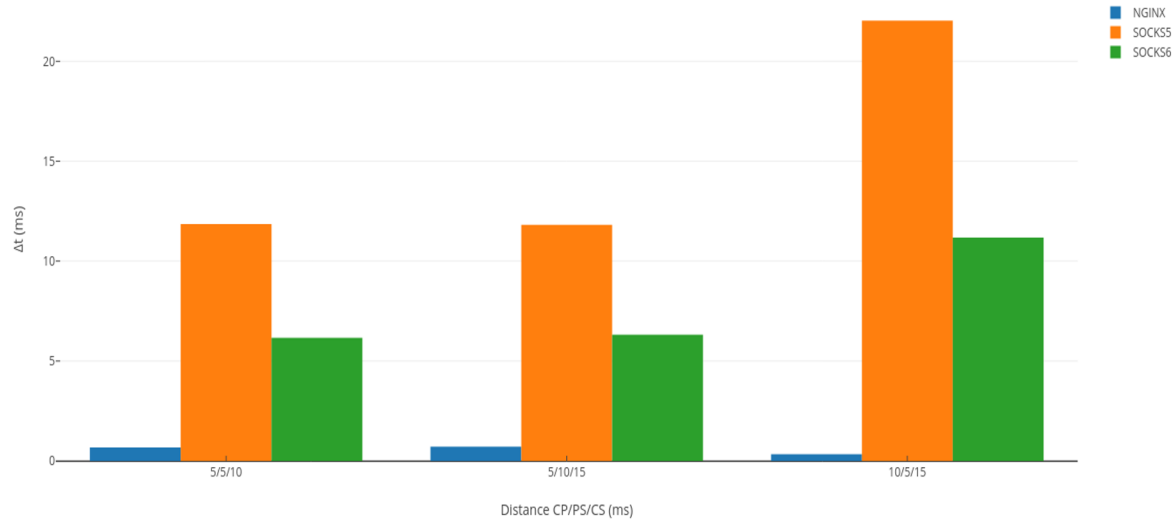
The Proxy-in-between topology:



The Triangular network topology:



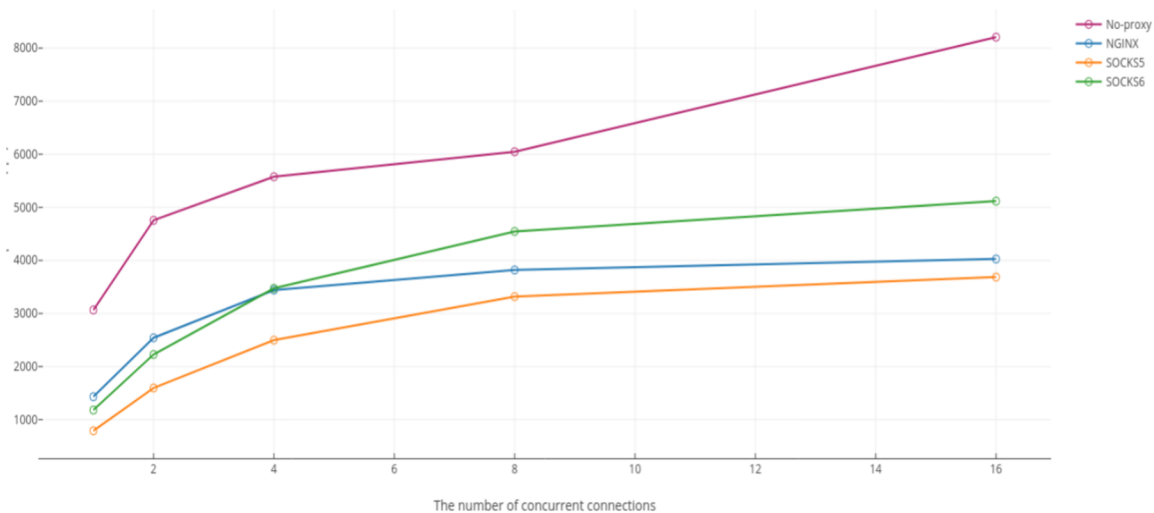
Proxy overhead (ms)



Insights:

- NGINX has the least overhead
- The placement of the proxy is highly relevant to the time performance
- SOCKS has the highest overhead due to the extra traffic implied during setup

Transaction processing rate (rps)



Insight

- The plot shows concurrent connections
- SOCKS6 has the highest throughput
- The plot flattens at 8 connections due to hitting a bottleneck of resources

Comparison

Parameters	NGINX	SOCKS5	SOCKS6
Δt	✓		
Processing rate			✓
Port scalability		✓	✓
Reconfiguration		✓	✓
Dynamicity		✓	✓
Security		✓	✓

Future work

- Considering more proxy implementations
- Implementing the BF chaining and uniform interfaces for BF
- Implementing Complex NF's chaining
- Evaluating in real test-beds with SURF
- Integration with WHITEBOX
- Utilising framework and applying use cases
 - Redirection tools
 - Chaining BF
 - Security of bridges
- Integration with policy