Today

Distributed Objects (Lesson 6)

⇒ Spring Kernel

Java RMI + EJB

Next week

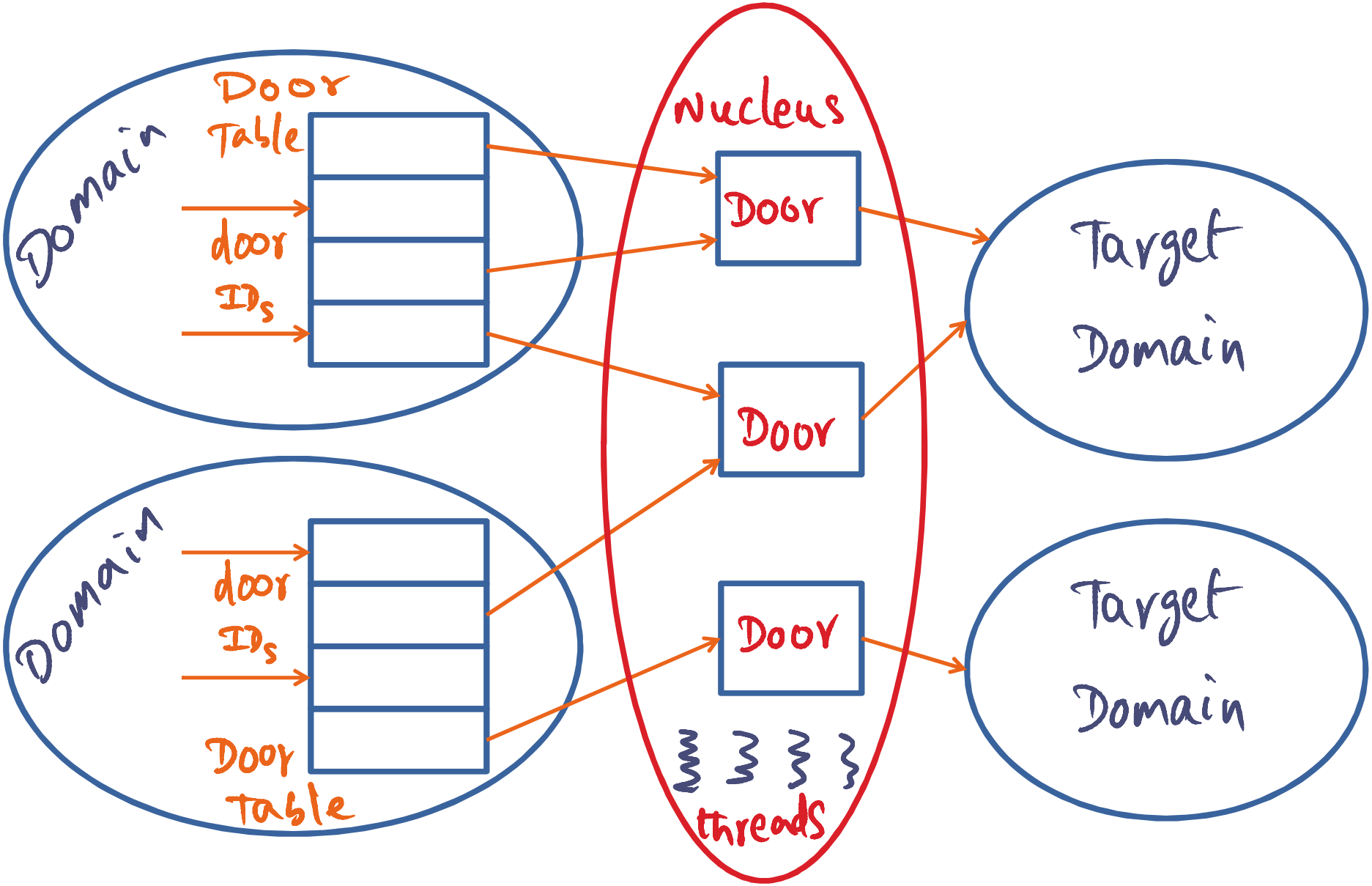
Distributed Subsystems (Lesson 7)

Friday, October 16, 2015 @ 2PM
Klaus 1116E & W

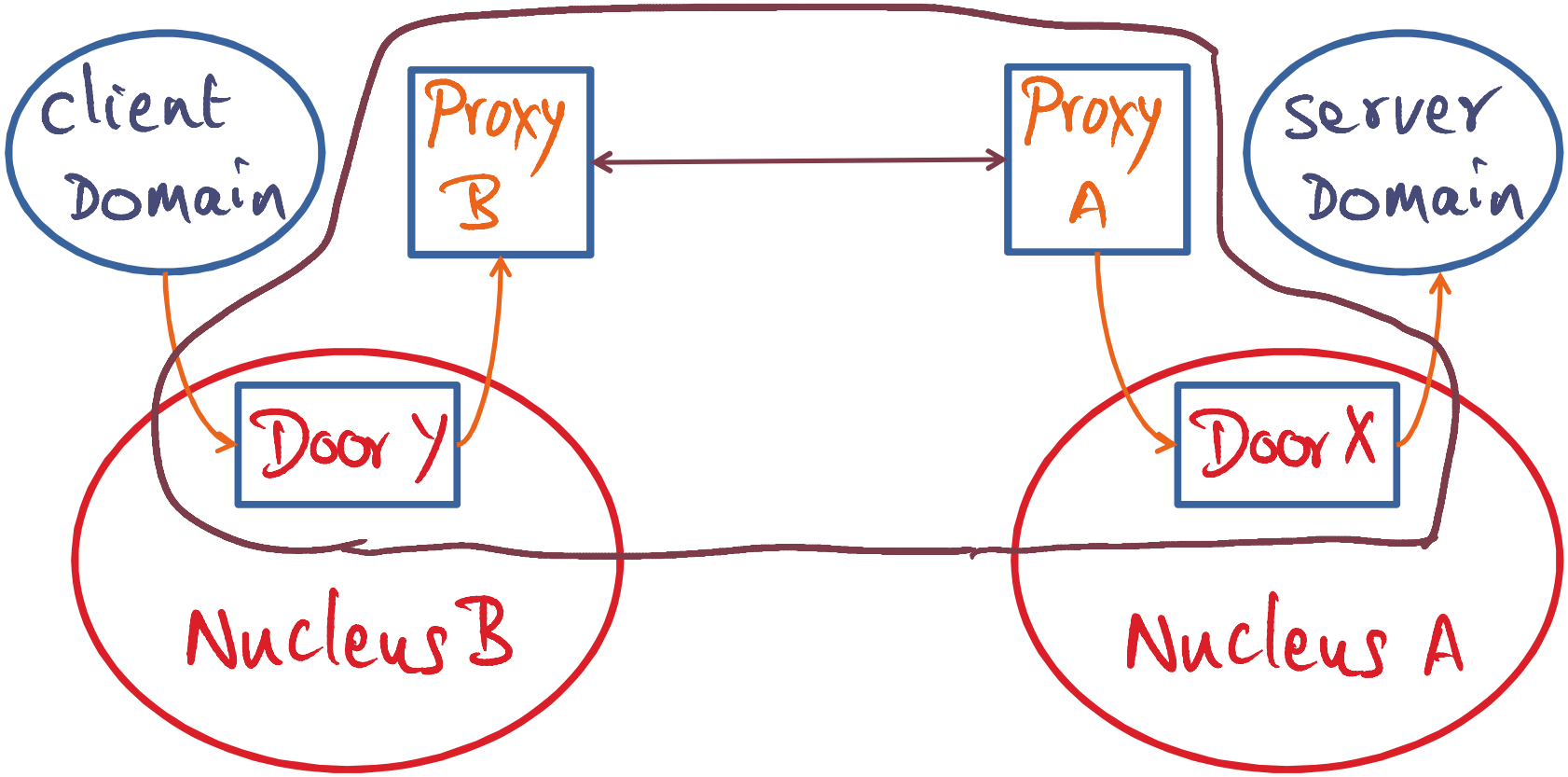
Title:
Confessions of a Systems Researcher

Speaker:
Kishore Ramachandran

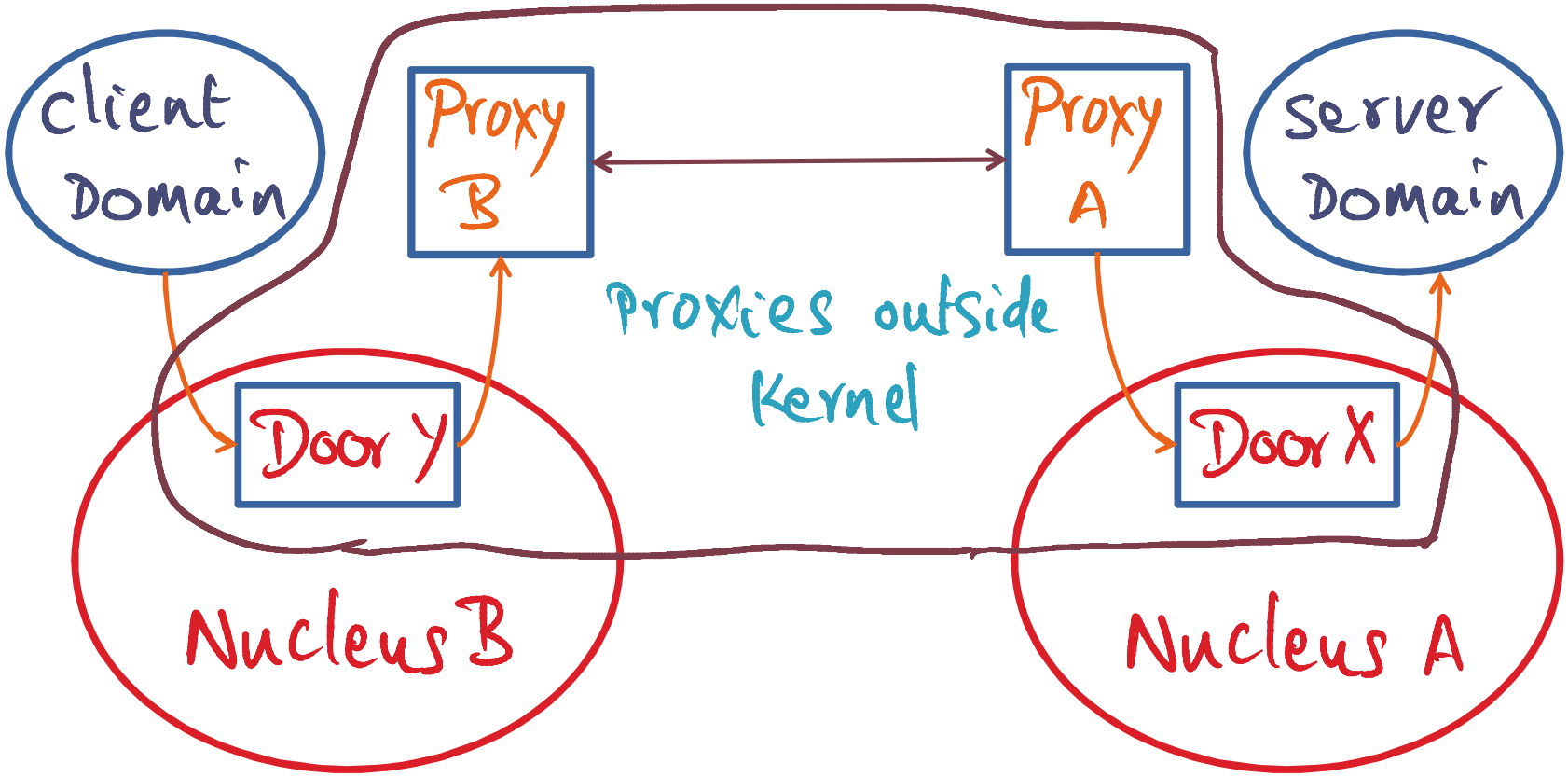
Nucleus - "micro kernel" of Spring



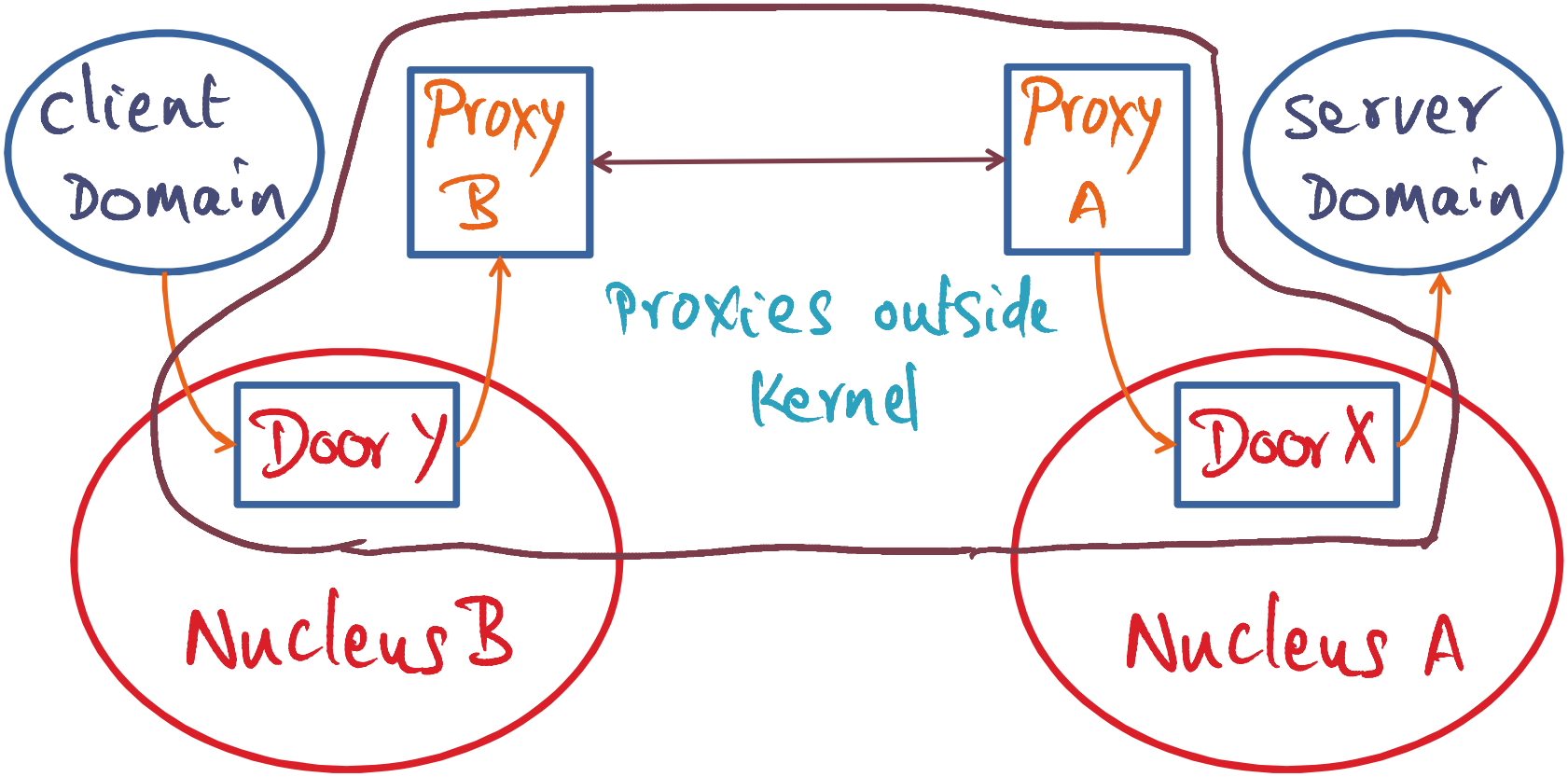
Object invocation Across the Network



Object invocation Across the Network

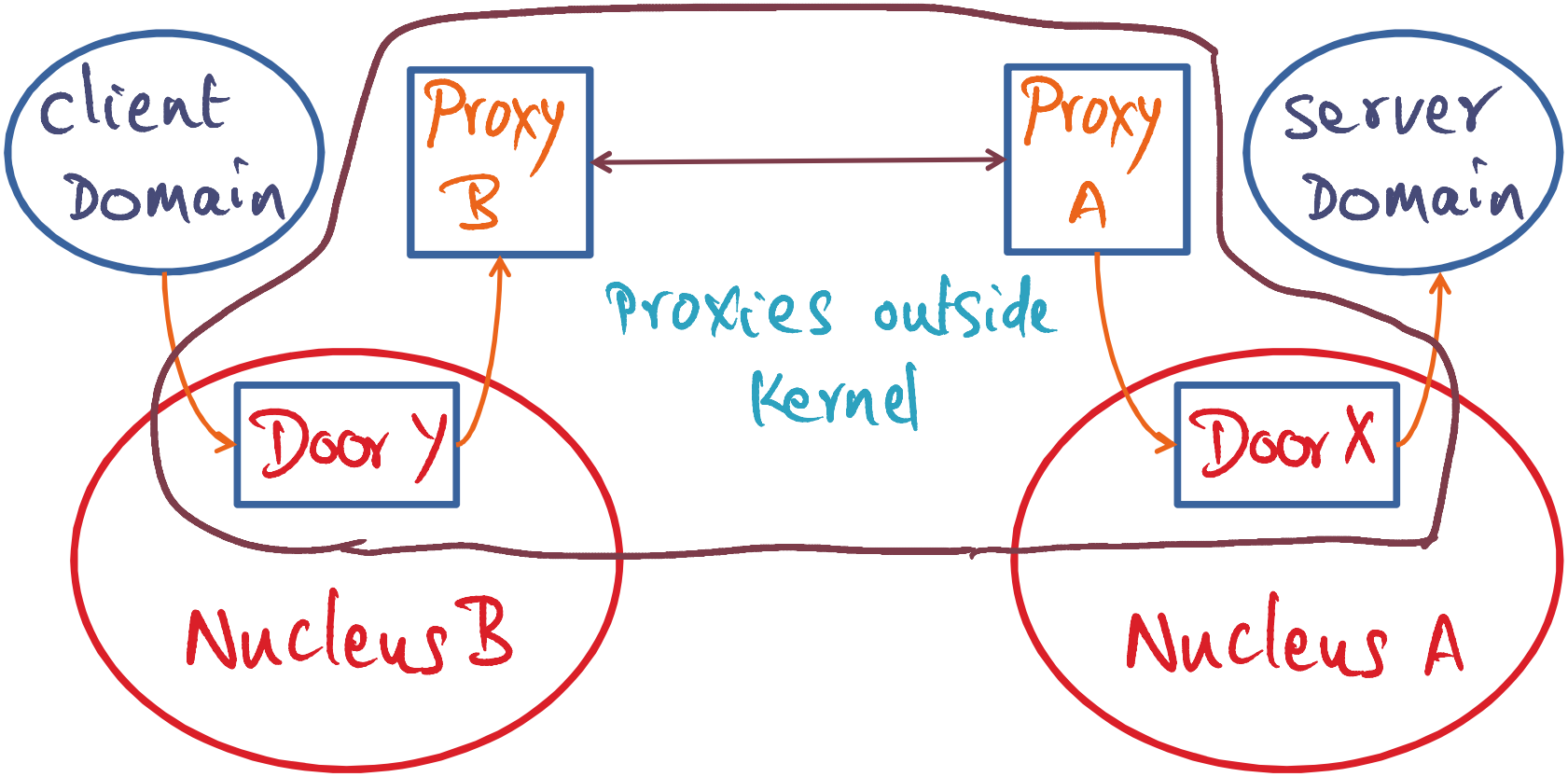


Object invocation Across the Network



Proxies invisible to client + server

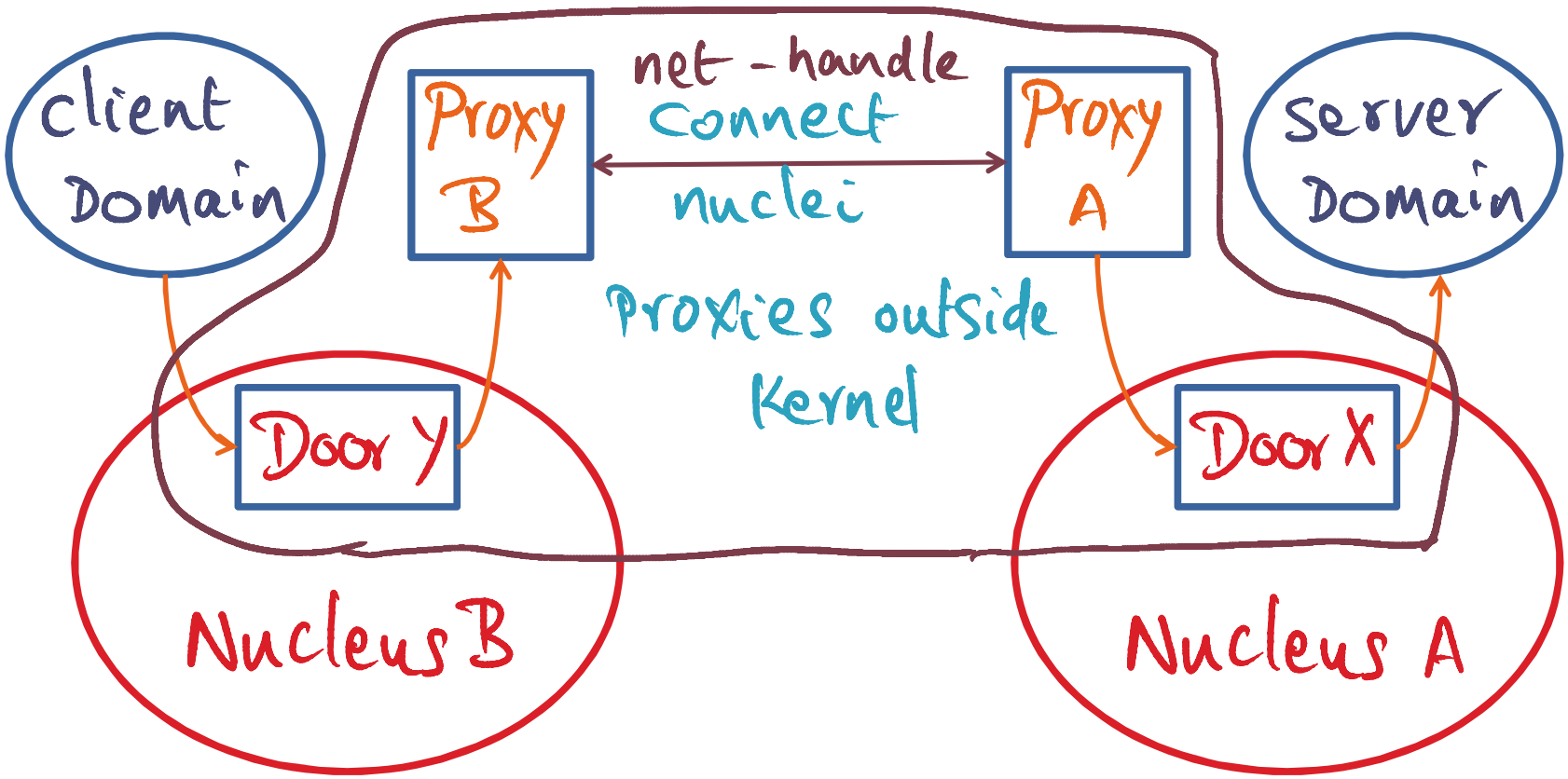
Object invocation Across the Network



Proxies invisible to client + server

- Proxy A : Export net handle embedding Door-X

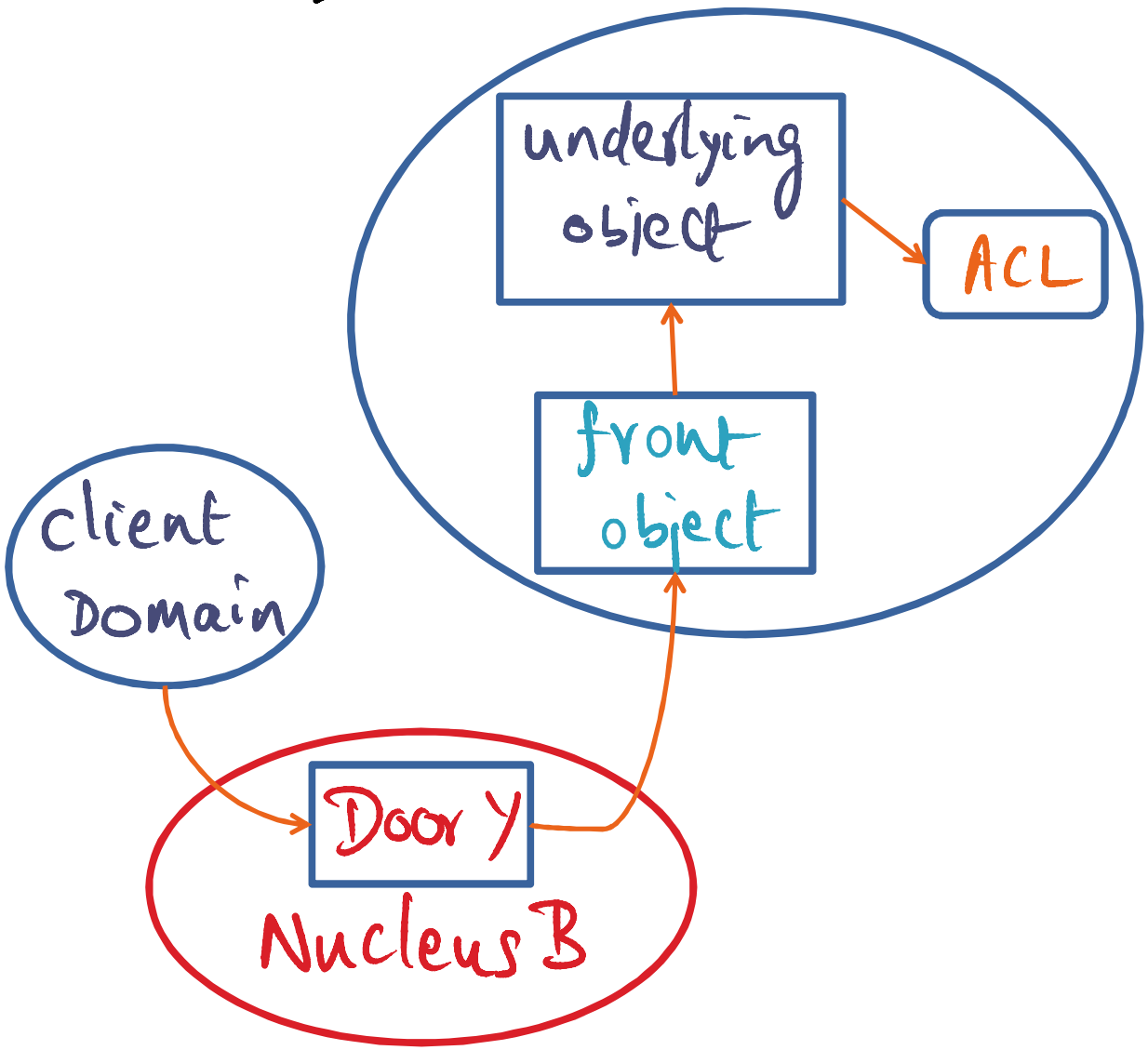
Object invocation Across the Network



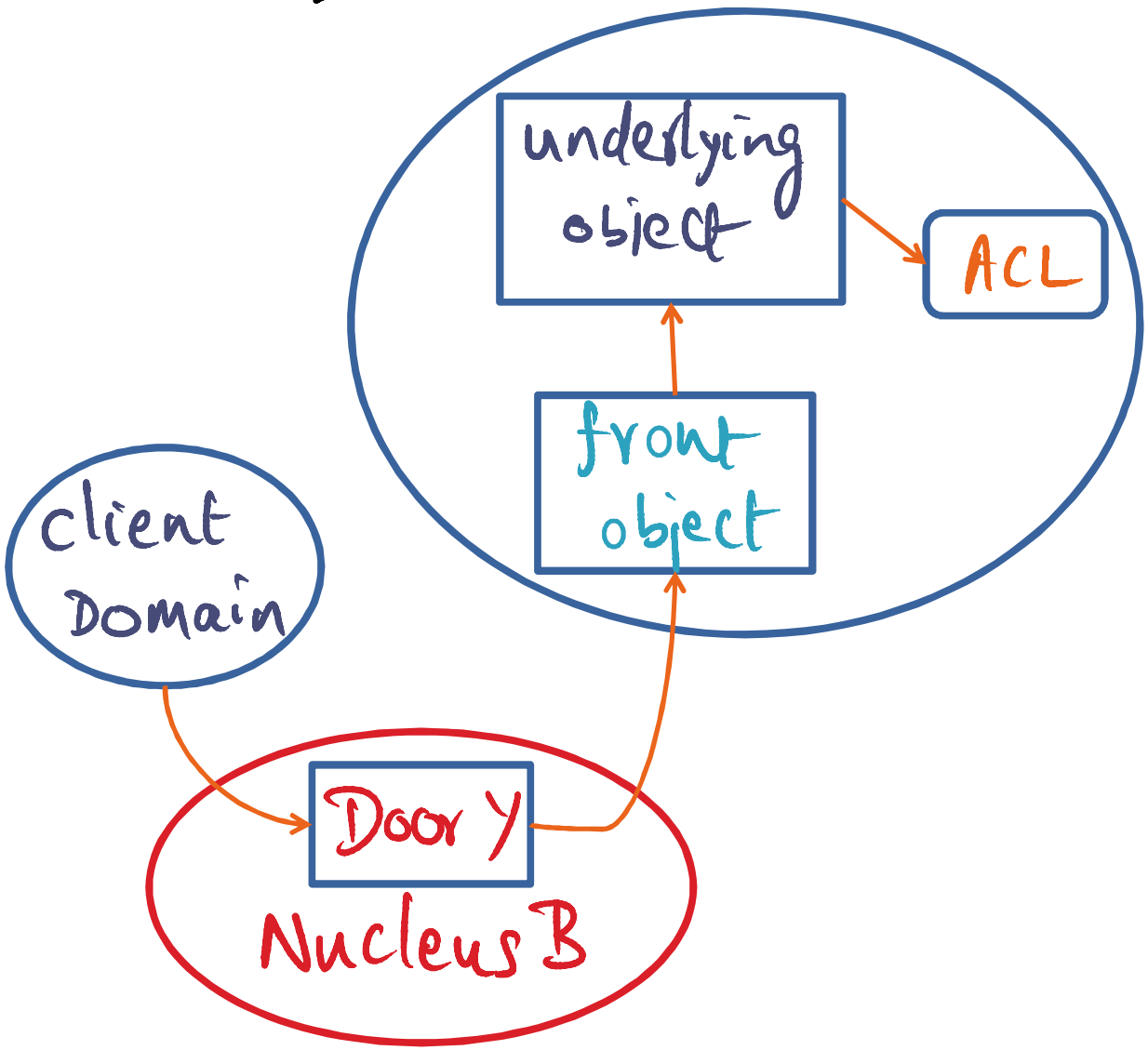
Proxies invisible to client + server

- Proxy A : Export net handle embedding Door-X
- Proxy B : use net handle to connect nuclei

Secure Object Invocation

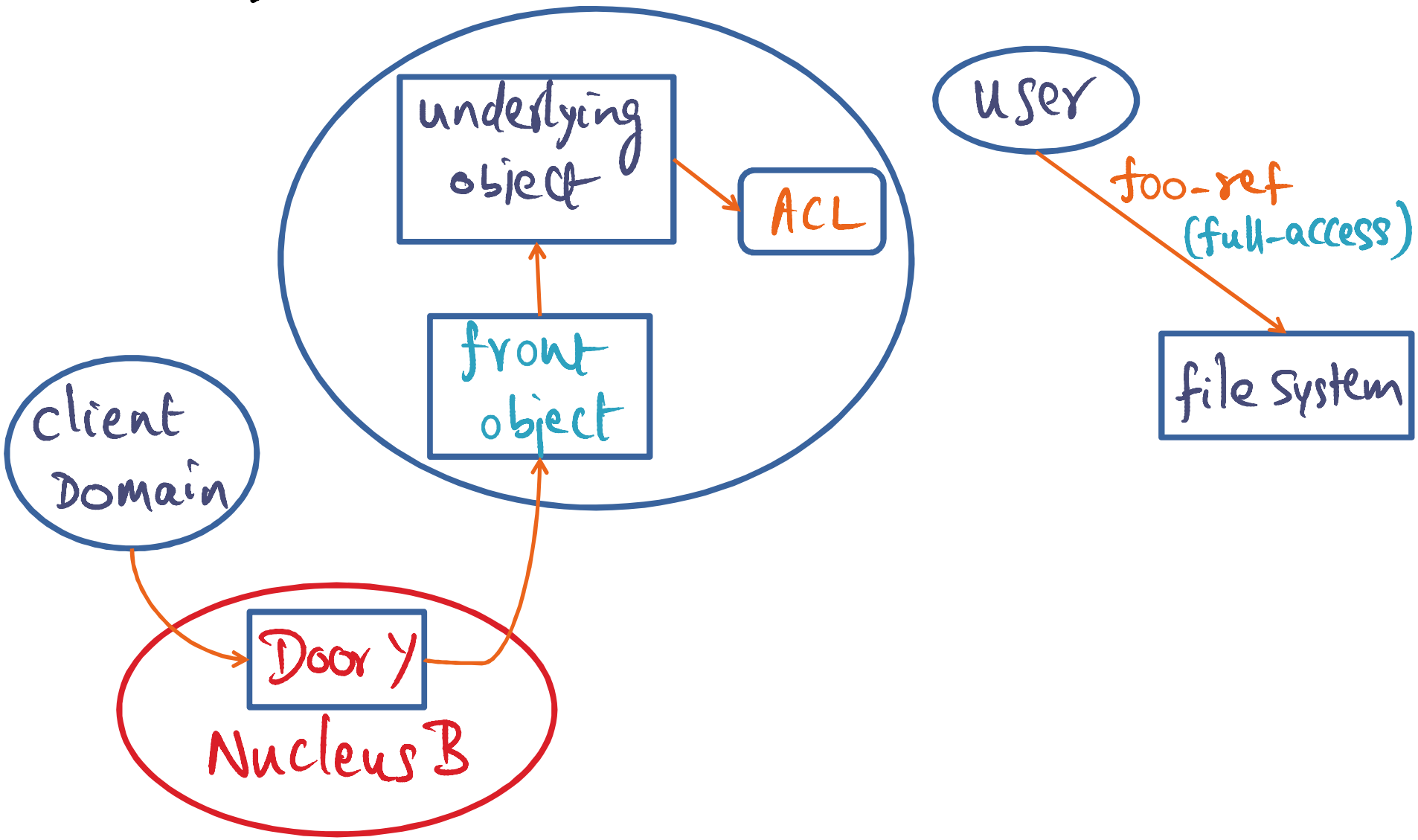


Secure Object Invocation



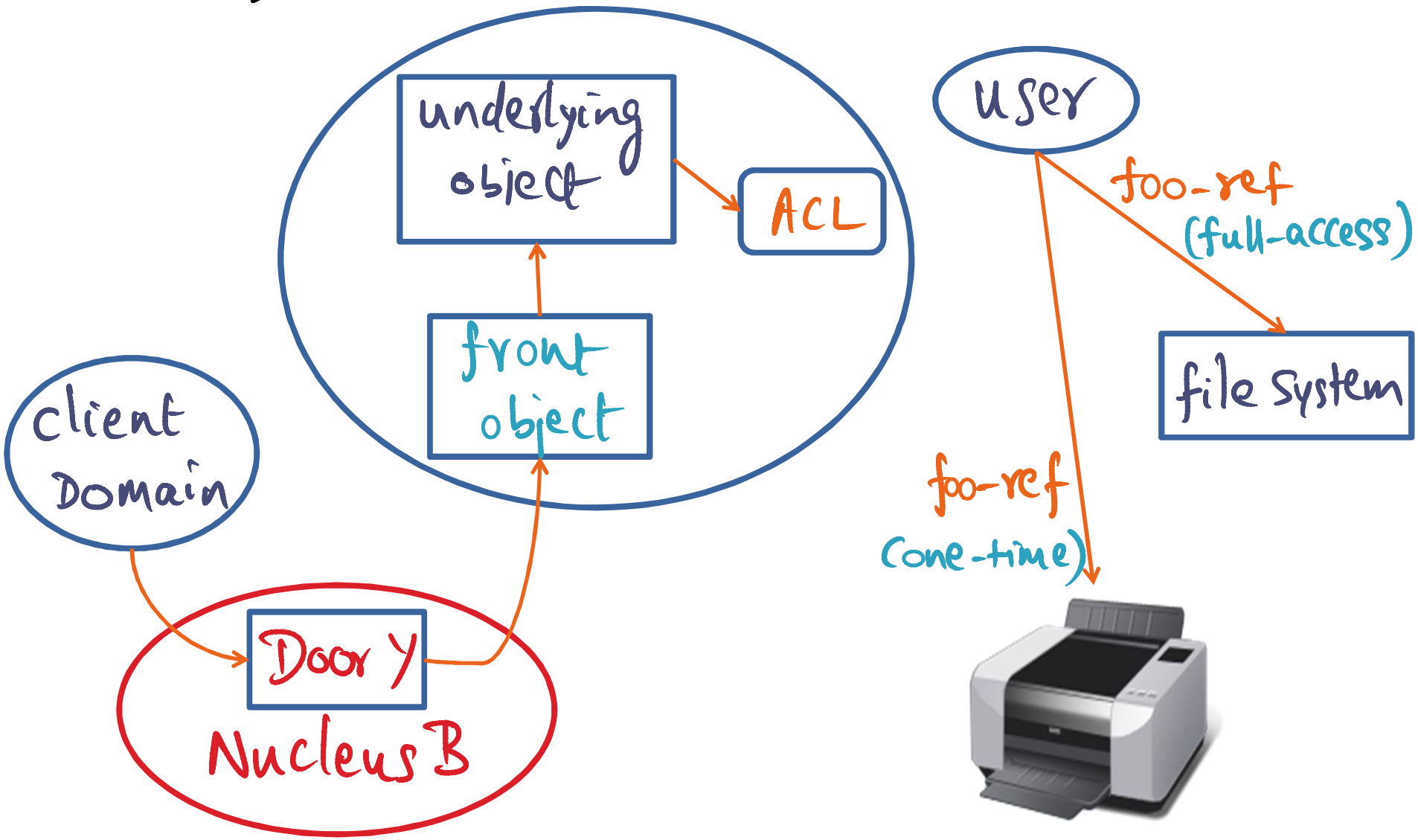
ACL checked before invocation

Secure Object Invocation



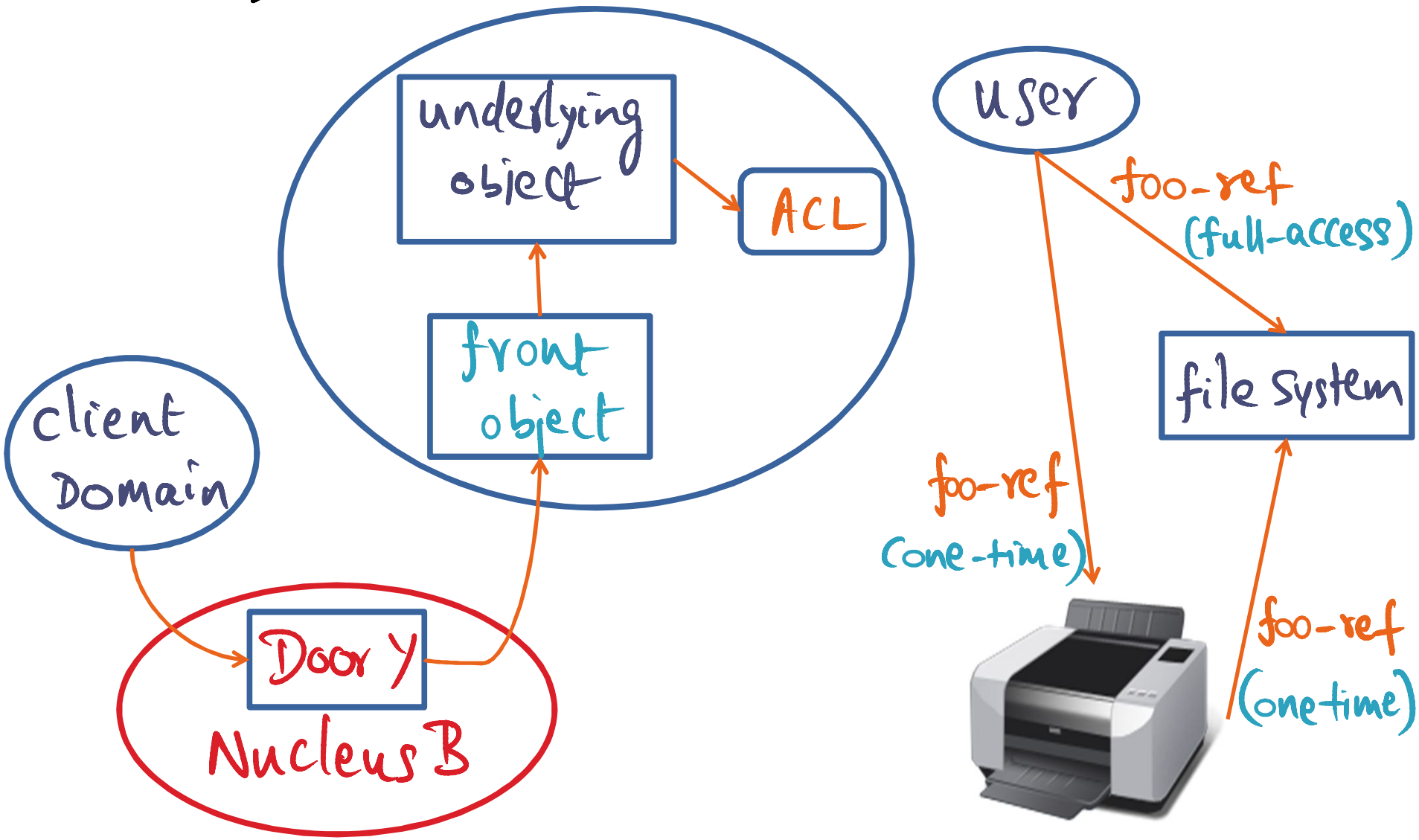
ACL checked before invocation

Secure Object Invocation



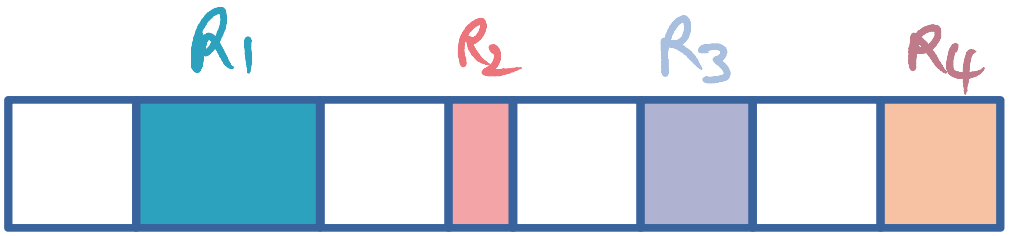
ACL checked before invocation

Secure Object Invocation



ACL checked before invocation

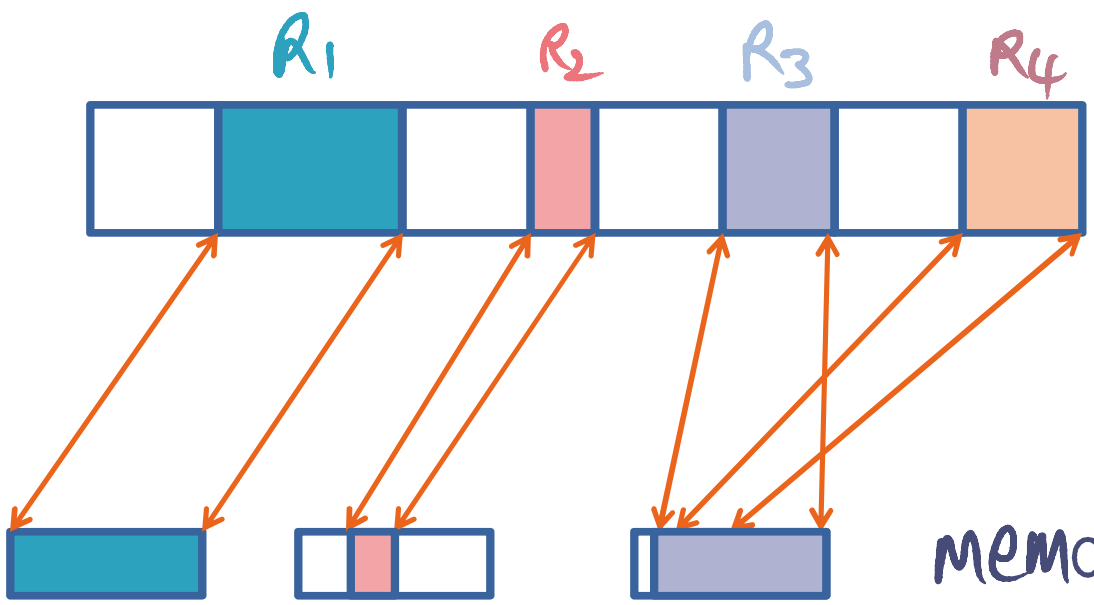
Virtual Memory Management in Spring



Regions: set of pages

Linear address space

Virtual Memory Management in Spring

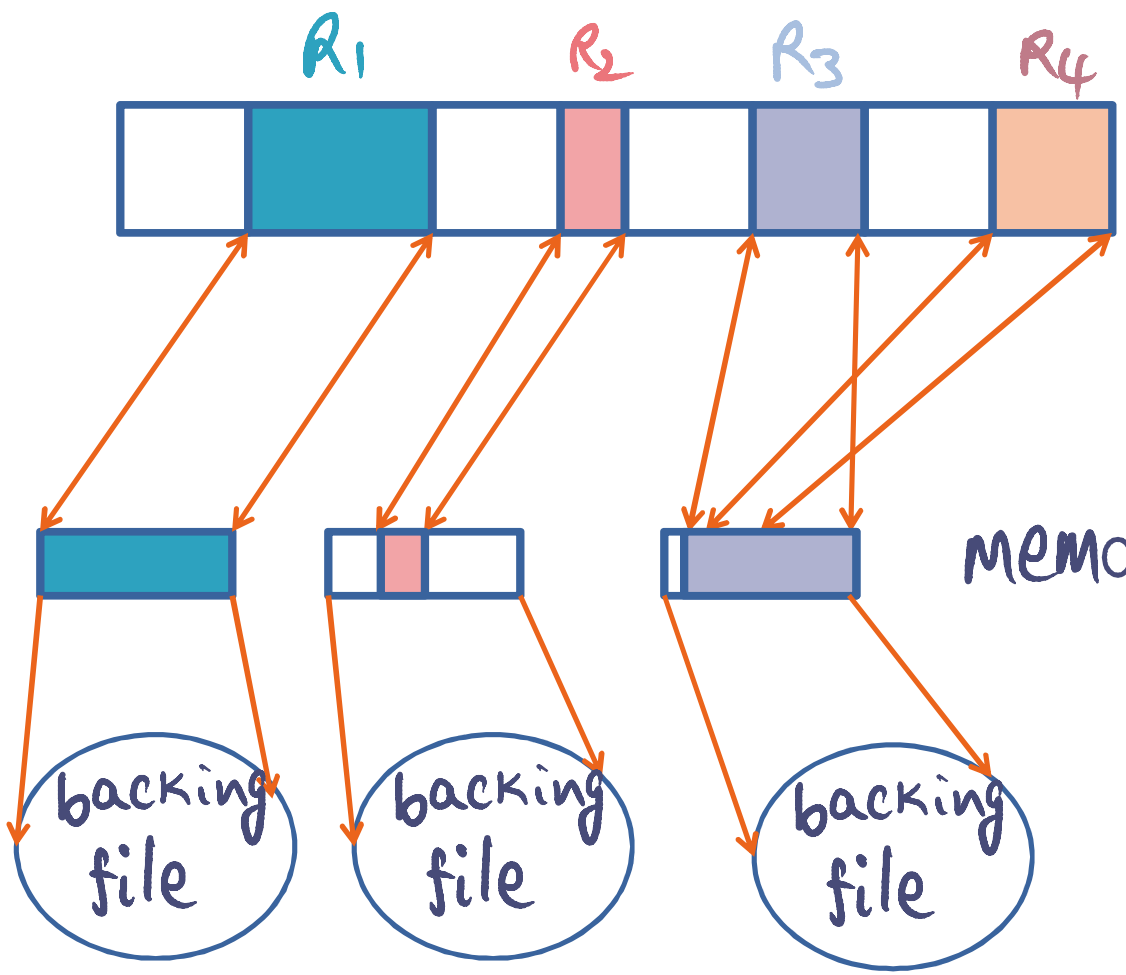


Regions: set of pages

Linear address space

memory objects

Virtual Memory Management in Spring



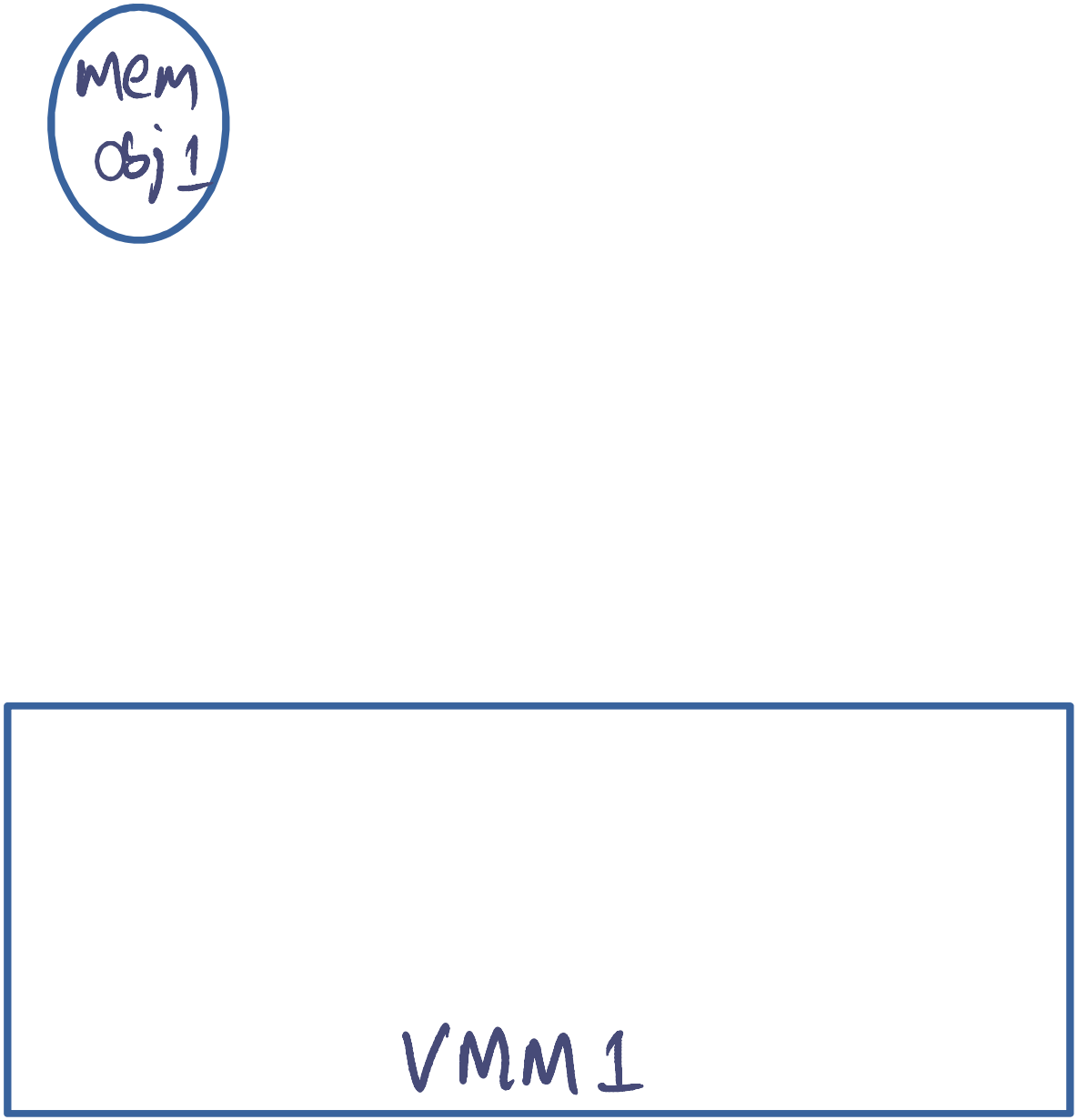
Regions: set of pages

Linear address space

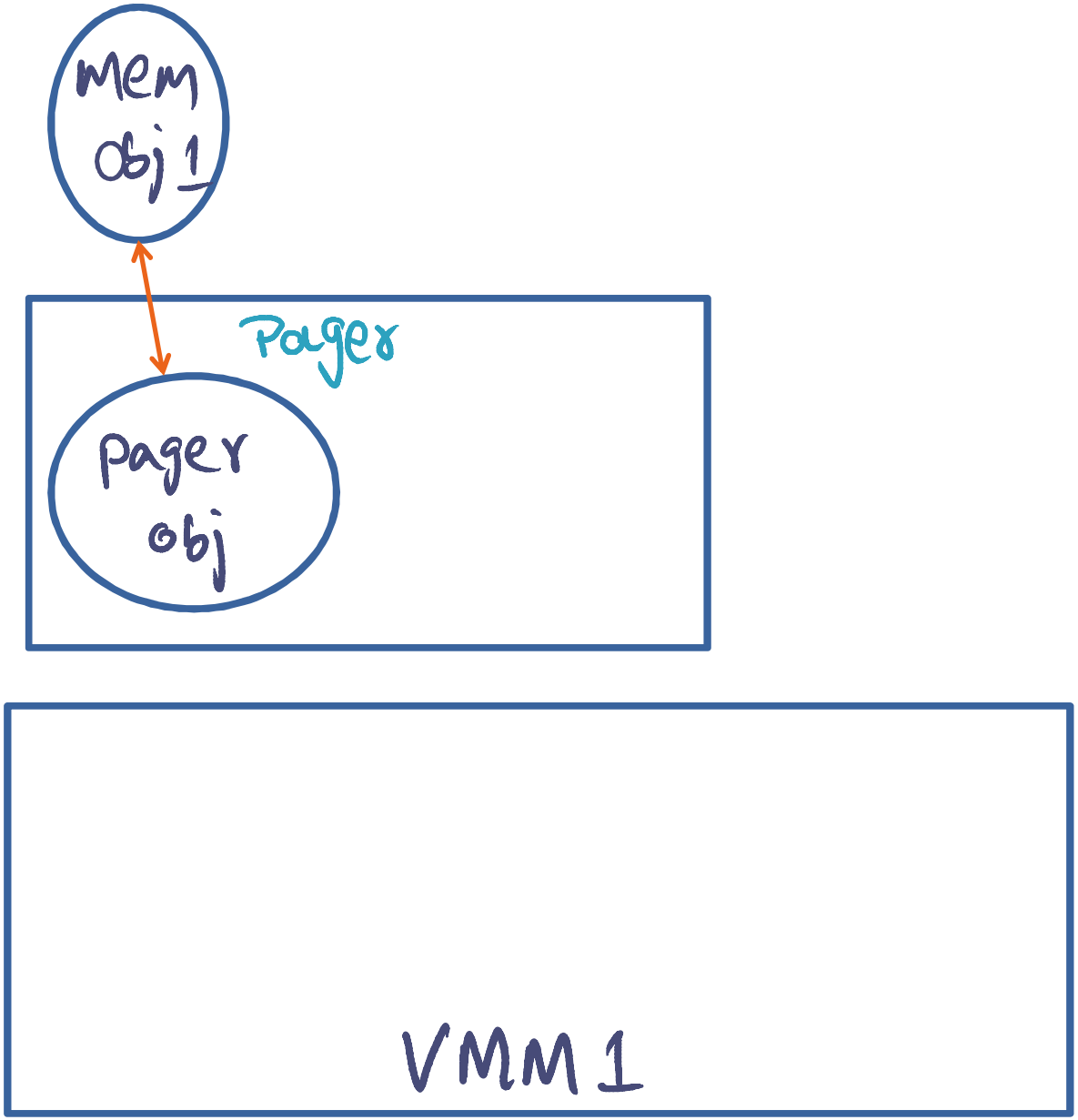
memory objects:

- abstraction may map to files, swap space, etc.

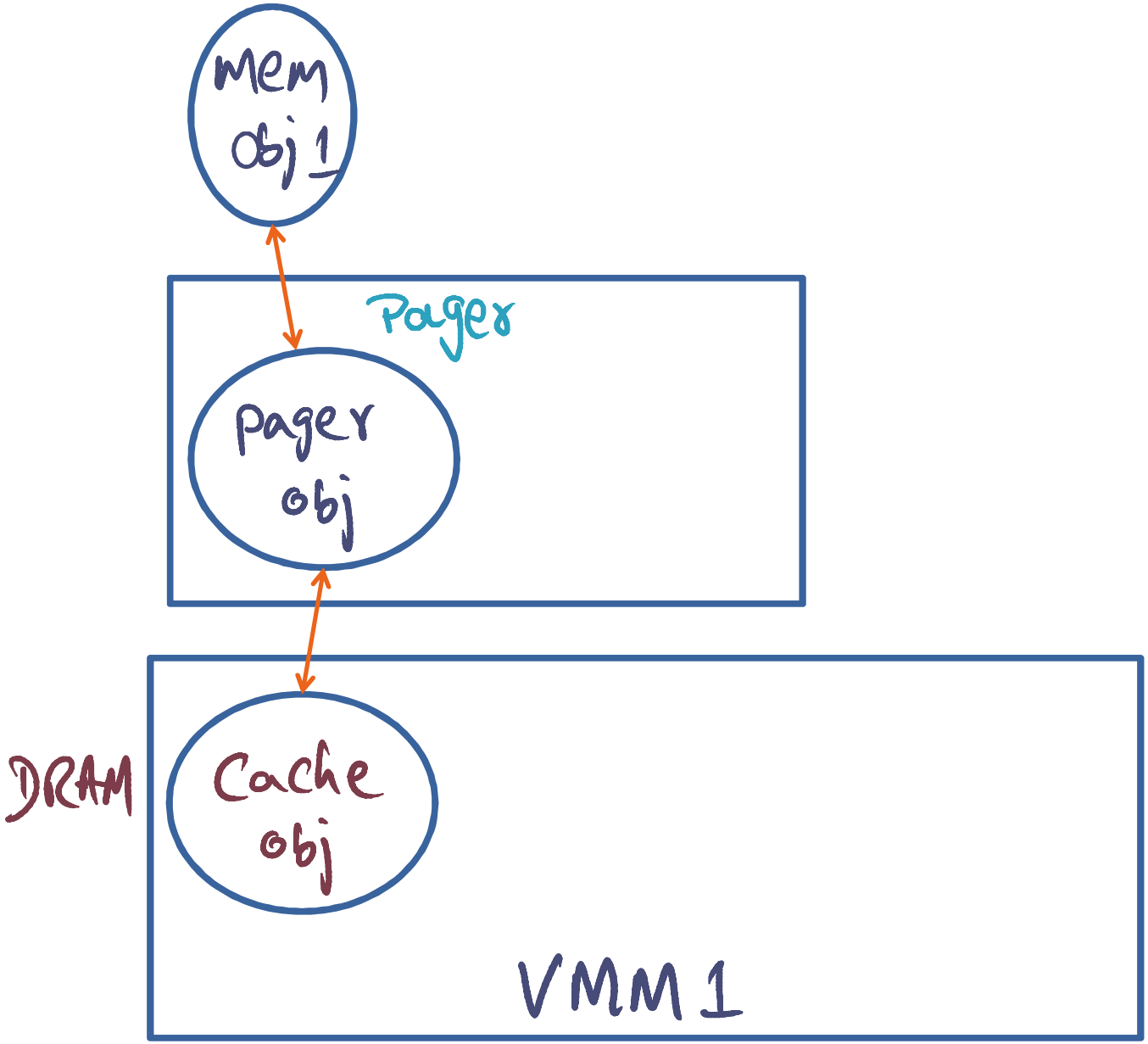
Memory object specific Paging



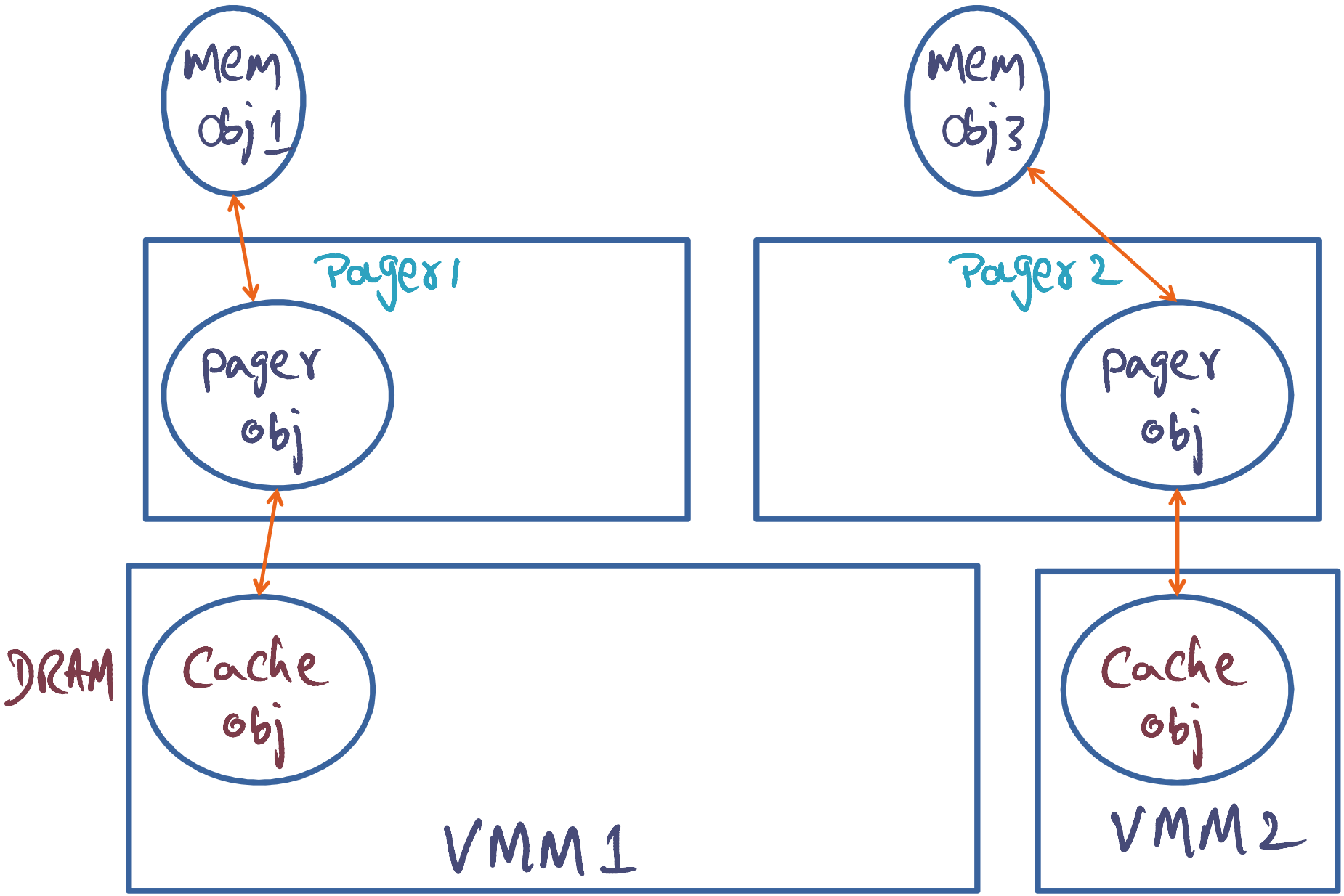
Memory object specific Paging



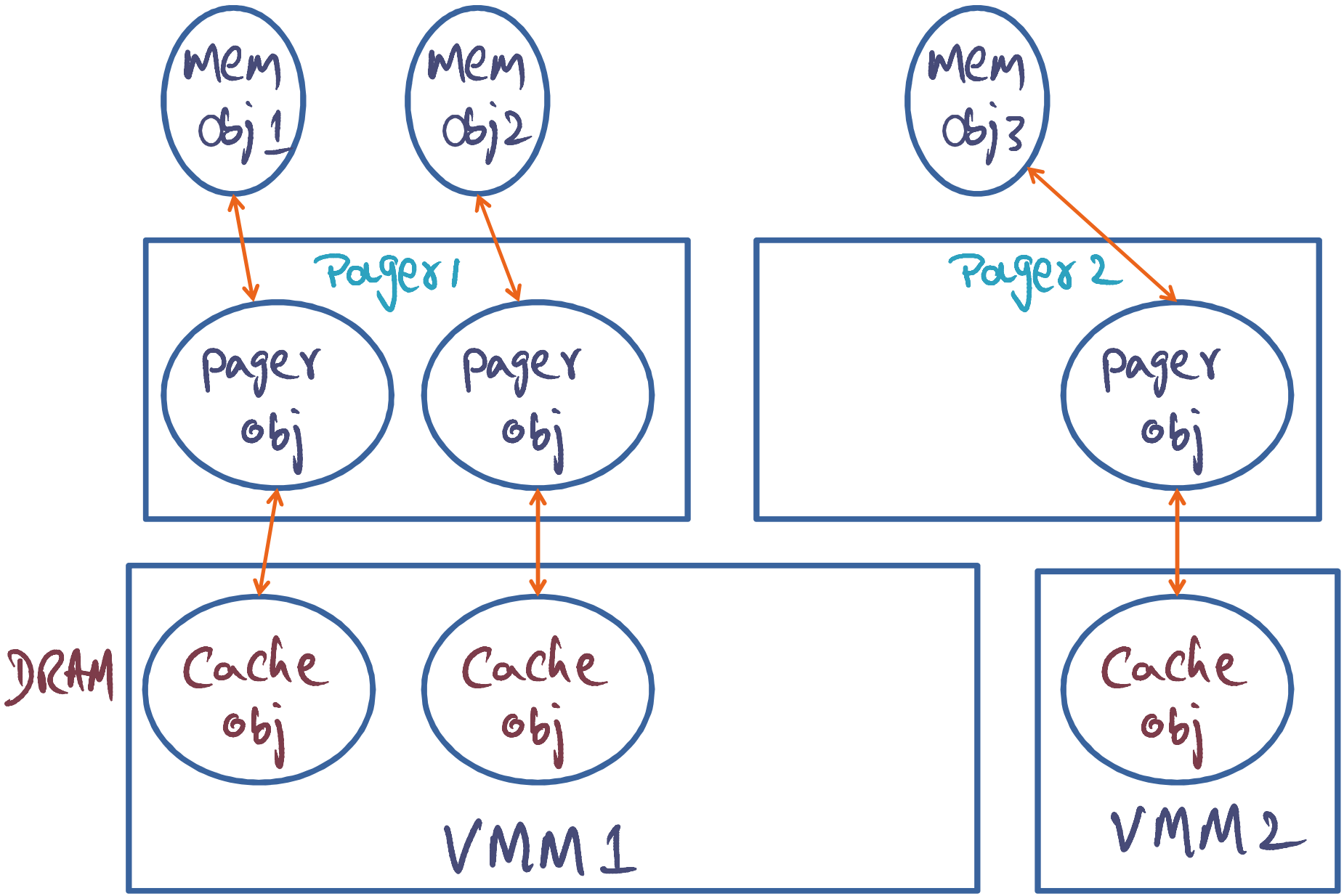
Memory object specific Paging



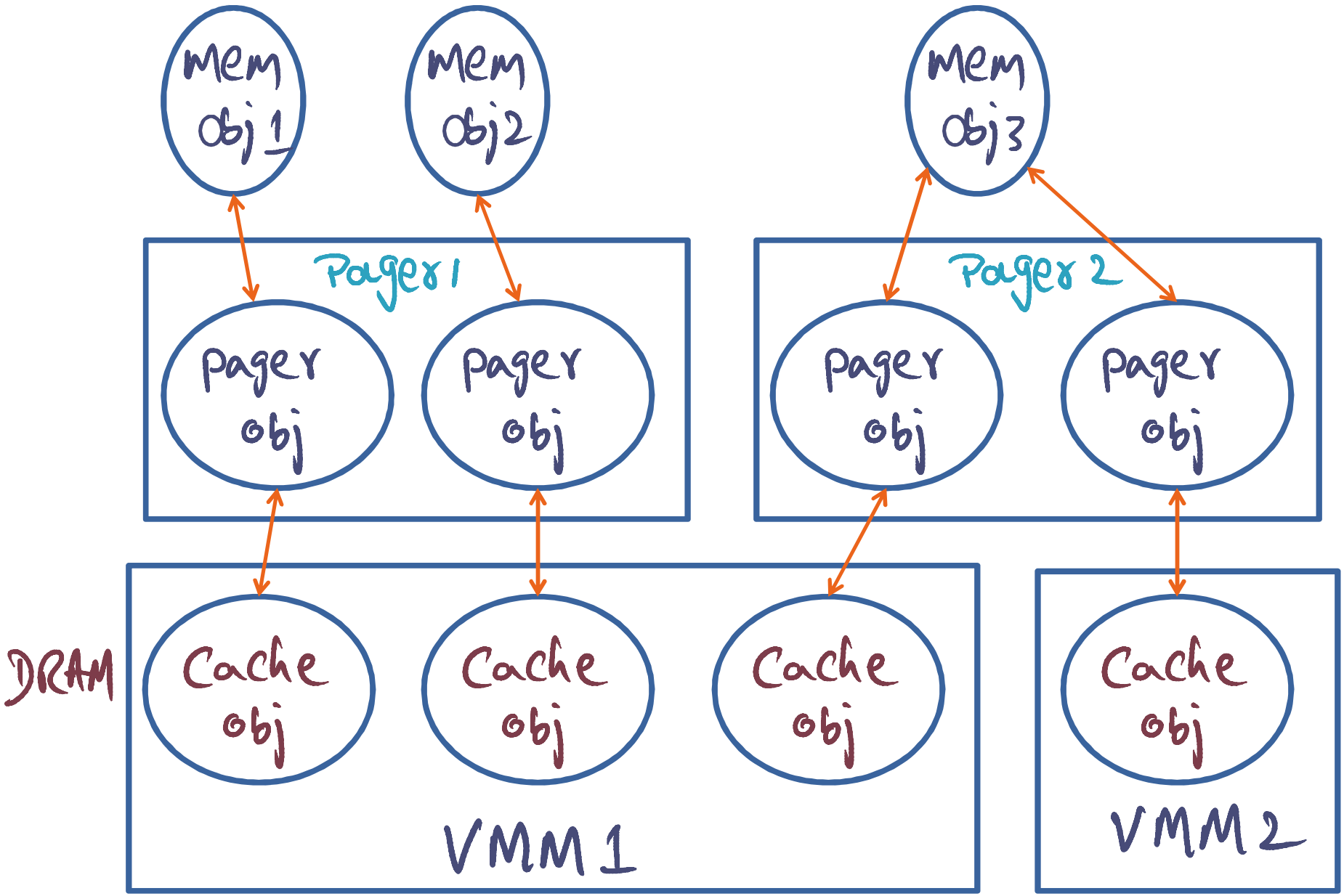
Memory object specific Paging



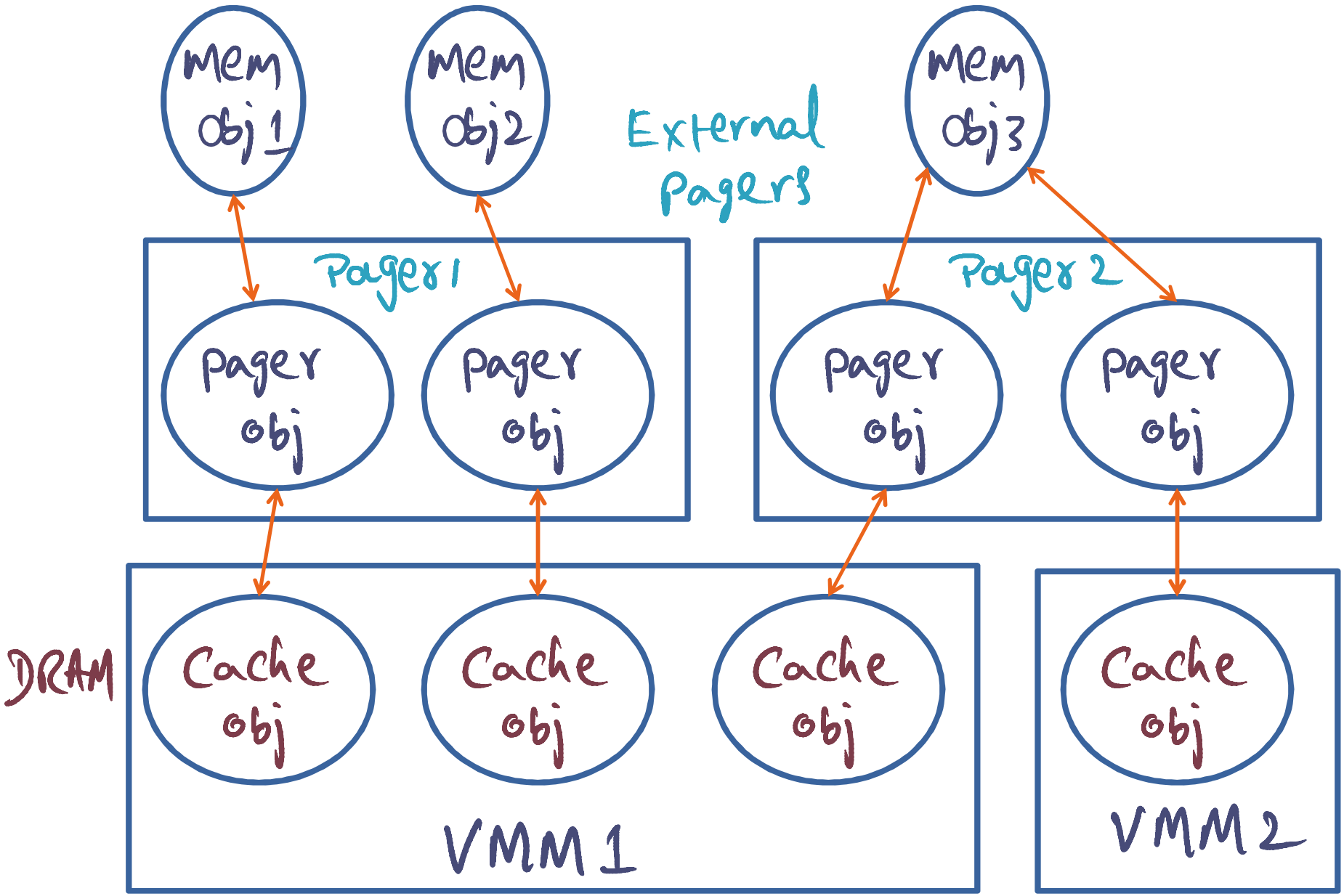
Memory object specific Paging



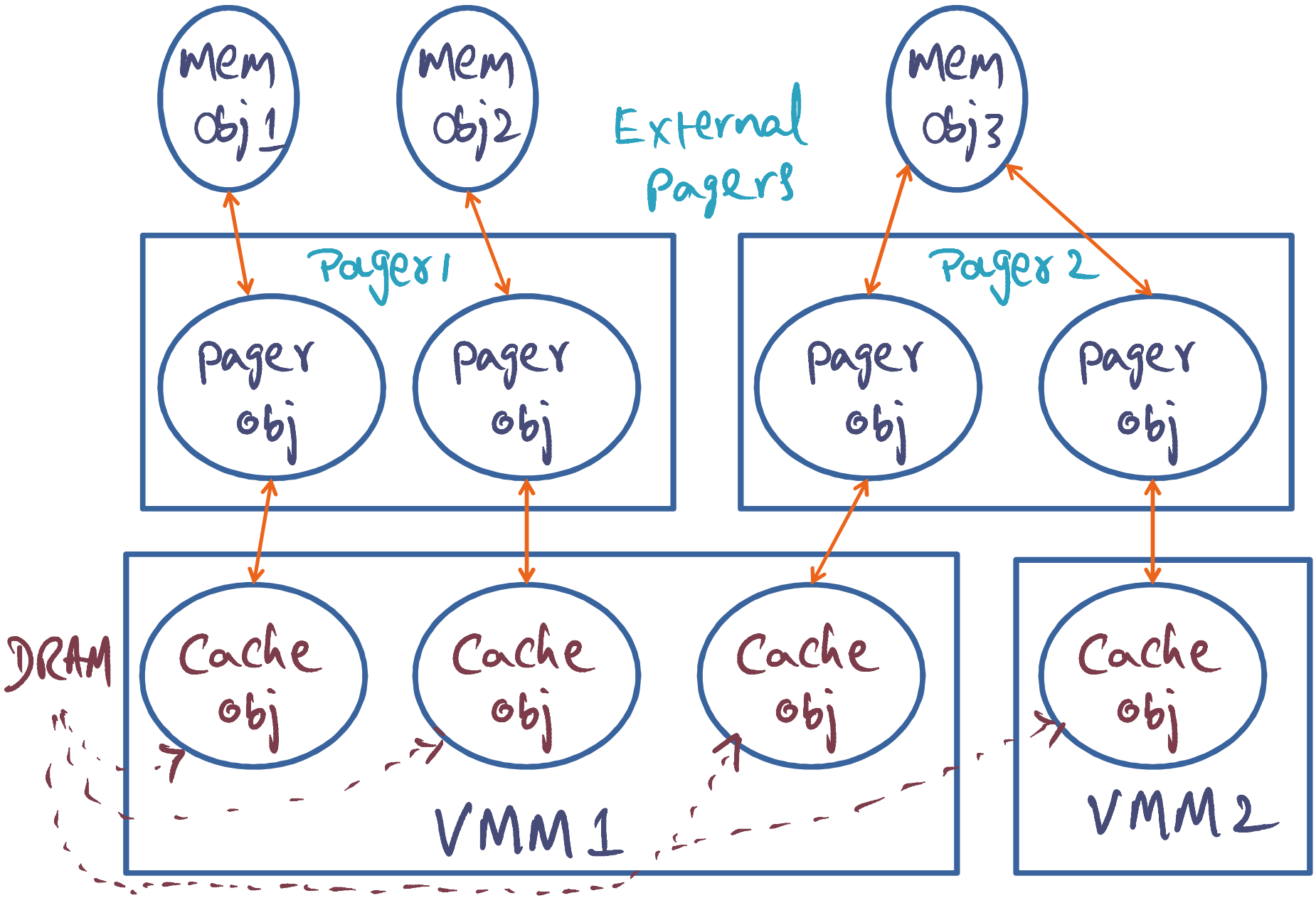
Memory object specific Paging



Memory object specific Paging



Memory object specific Paging

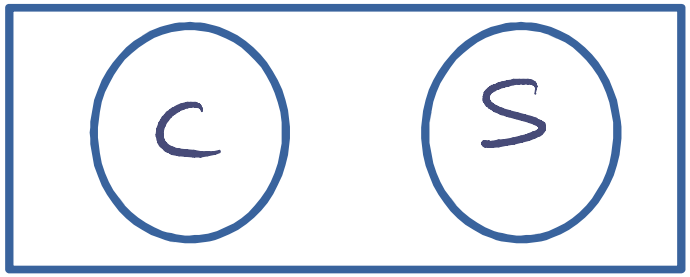


Spring System Summary

Object oriented kernel

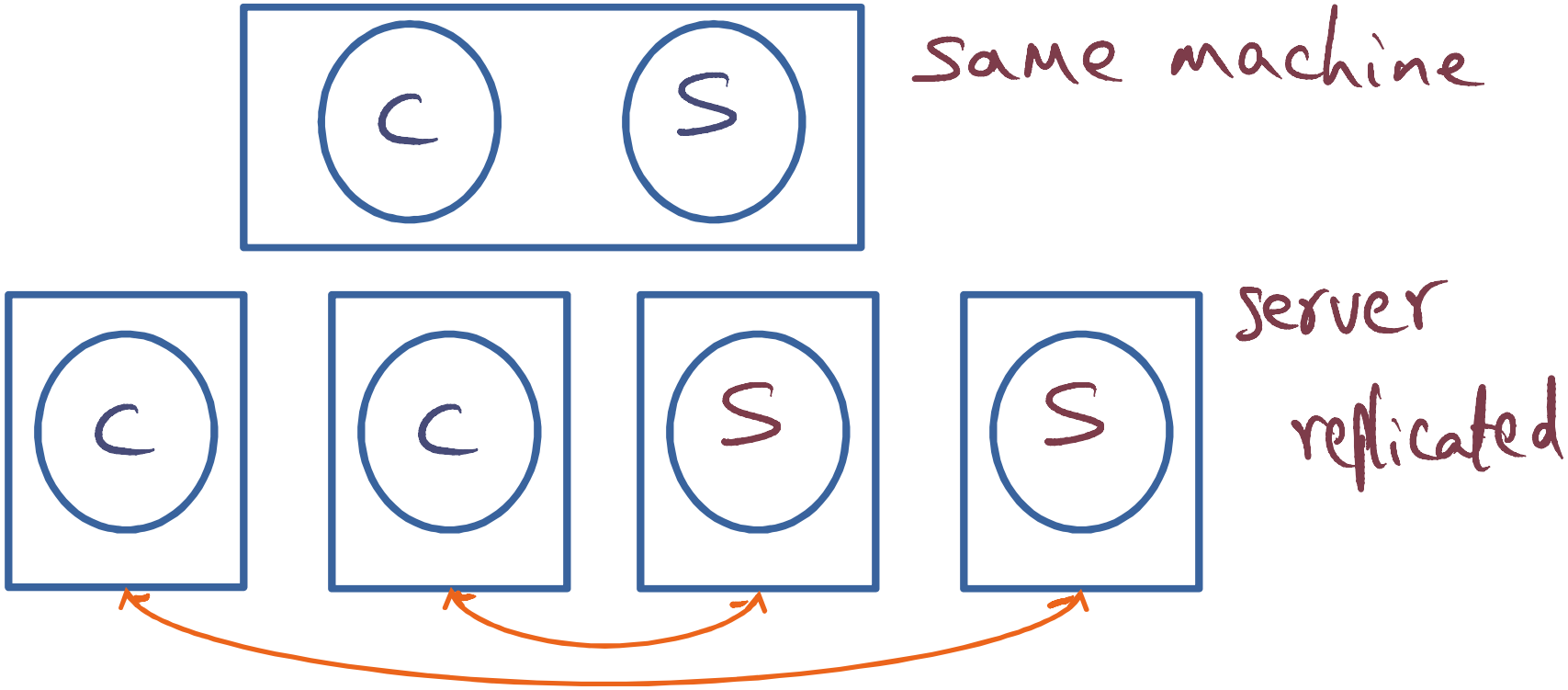
- nucleus → Threads + IPC
- microkernel → nucleus + Address space
- Door + Door table → basis for cross domain calls
- object invocation and cross machine calls
- Virtual memory management
  - * Address space object, memory object, External pagers, Cached obj

Dynamic client server Relationship

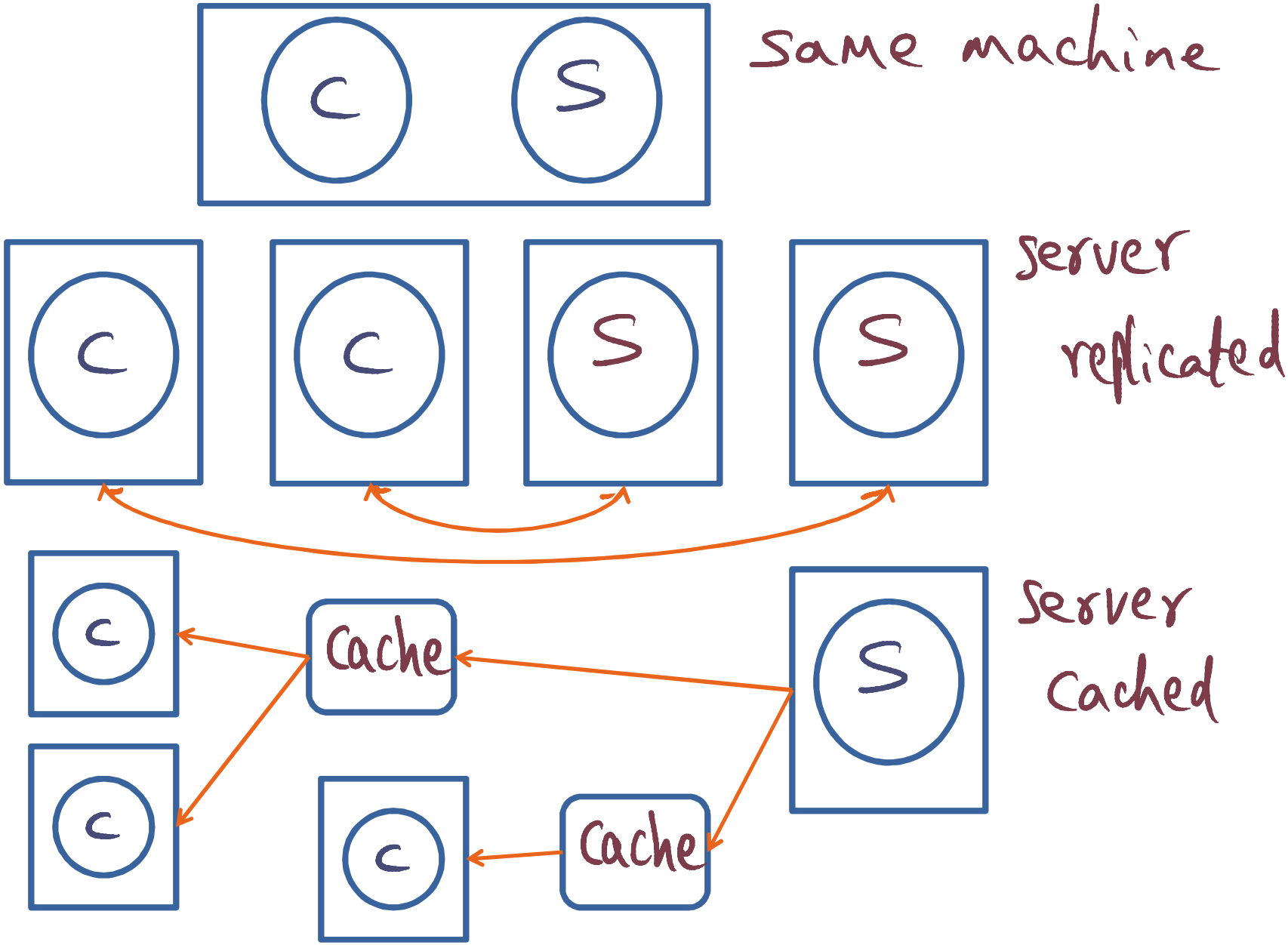


same machine

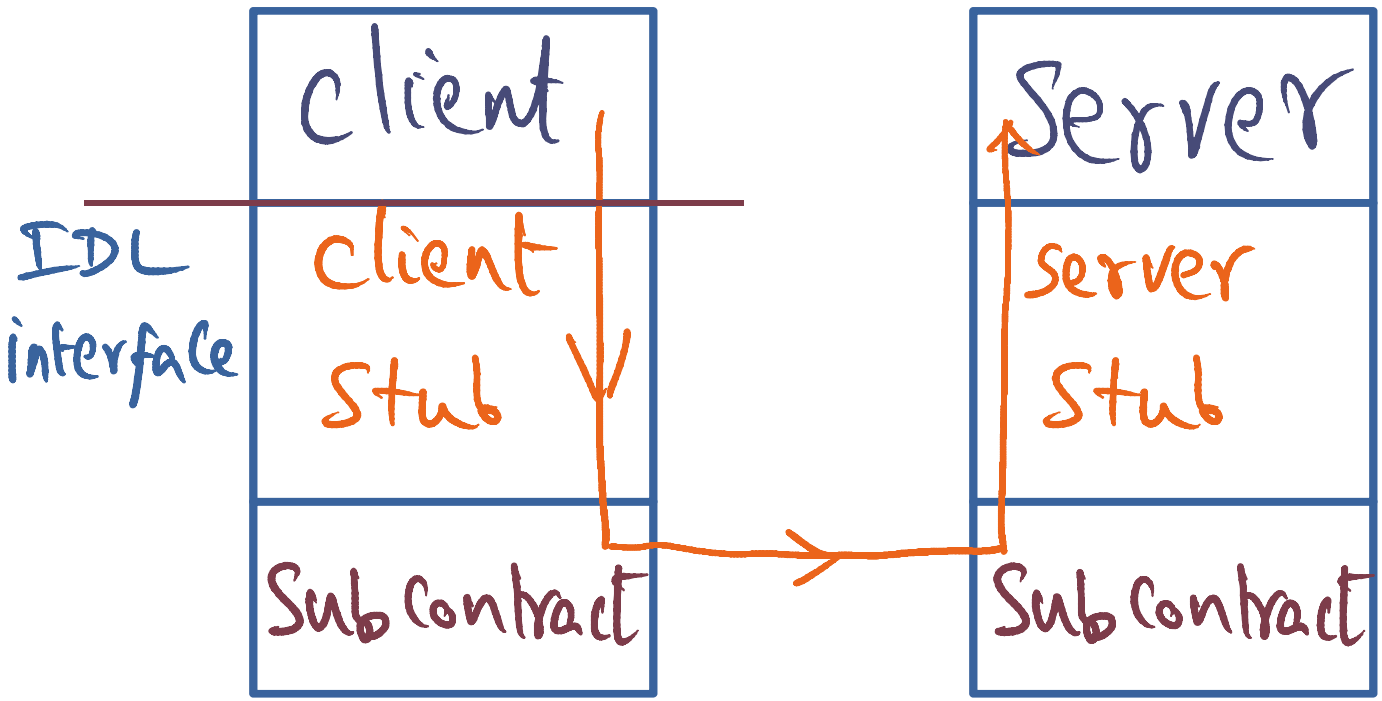
Dynamic client server Relationship



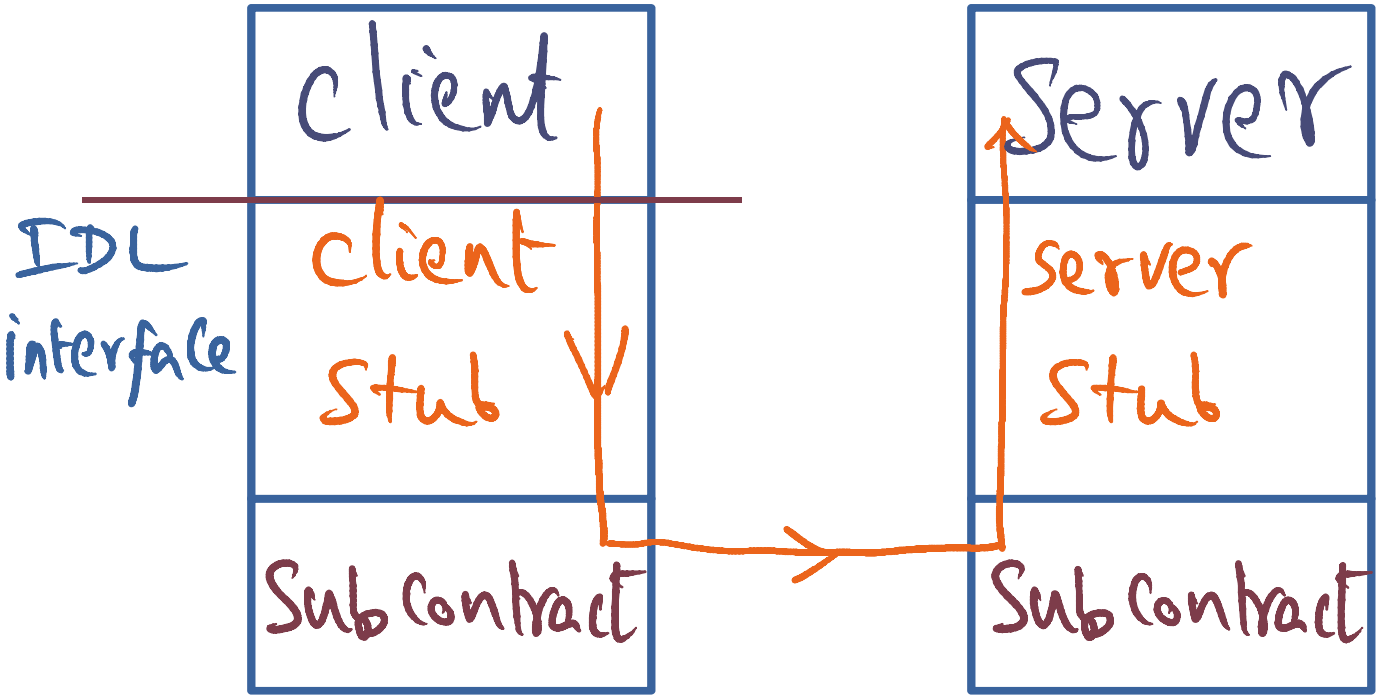
Dynamic client server Relationship



Subcontract

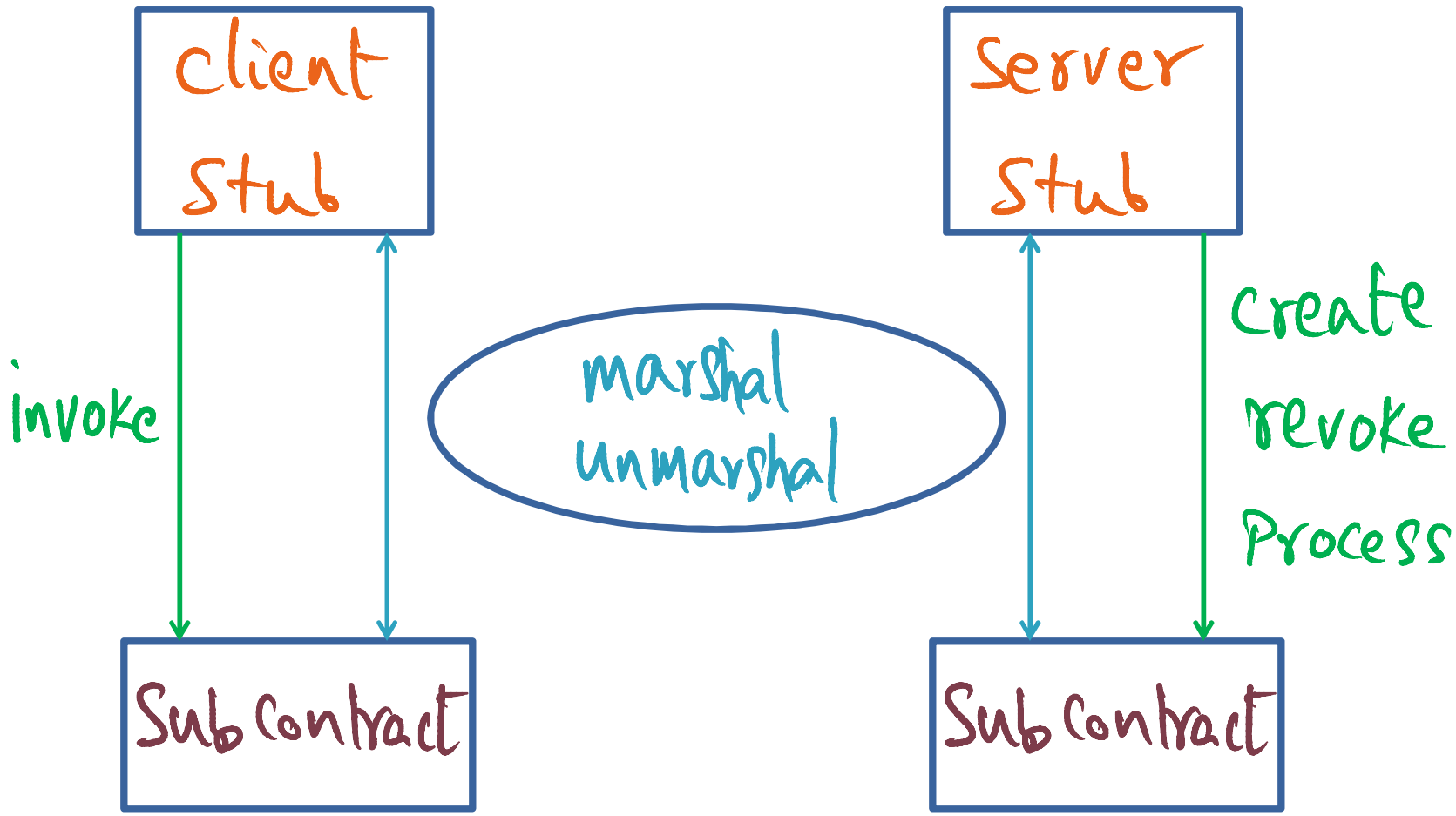


Subcontract

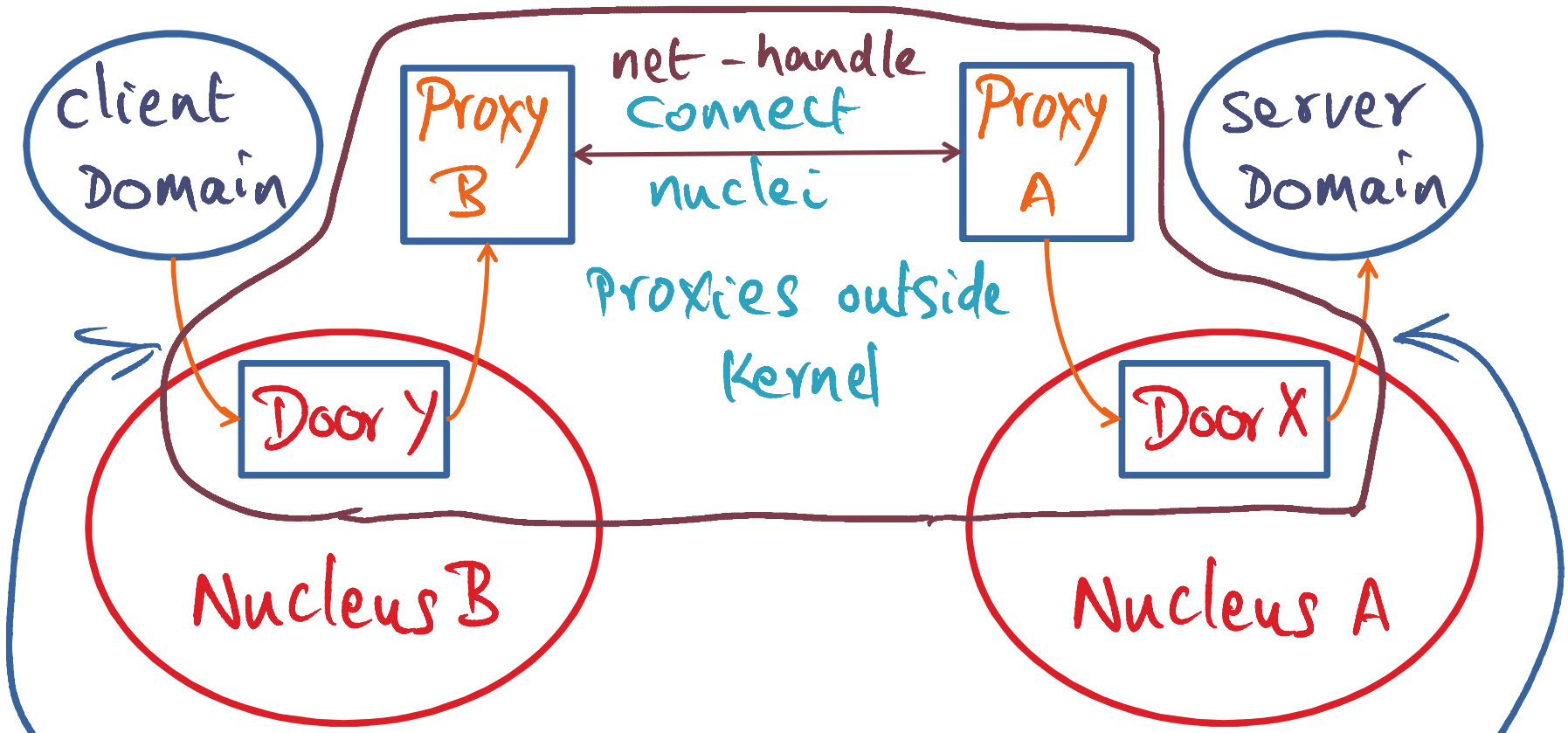


- client side stub generation simplified
- subcontract responsible for details

Subcontract interface for stubs



Object invocation Across the Network



Accomplished using Subcontract

Key Takeaways

- How to “innovate” under the covers.
- Externally Unix, internally revolutionized the structure of network OS
  - use of object technology
- If object-orientation is good at the kernel level it should be good at higher levels as well!
- Subcontract mechanism that Sun invented as part of the Spring system formed the basis for something that many of you who are Java programmers use a lot: Java RMI