A Proposal of Access Control Mechanism Towards User-dedicated PRAGMA-ENT for IoT Era

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IoT Era

The IoT Era has arrived.

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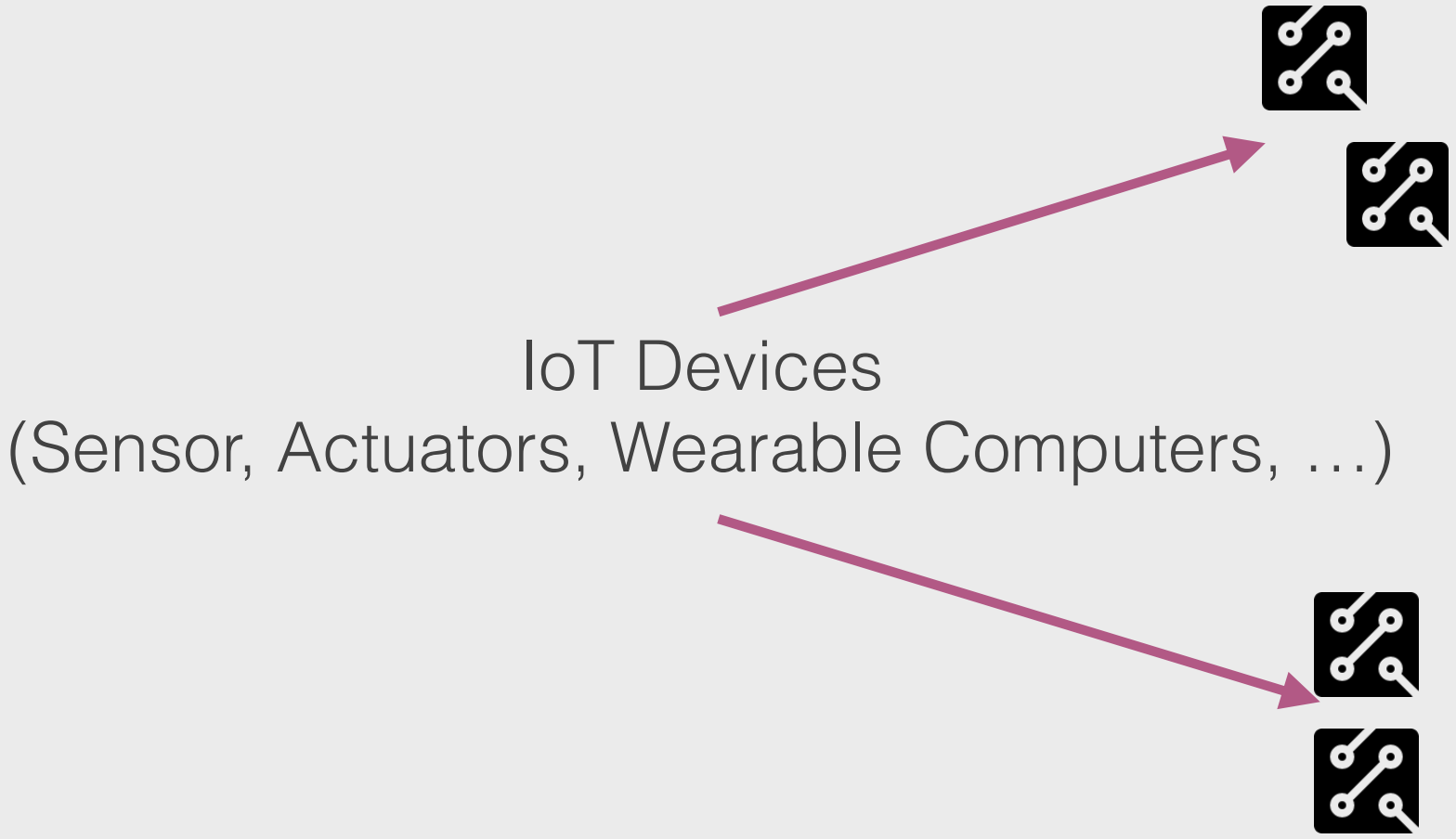

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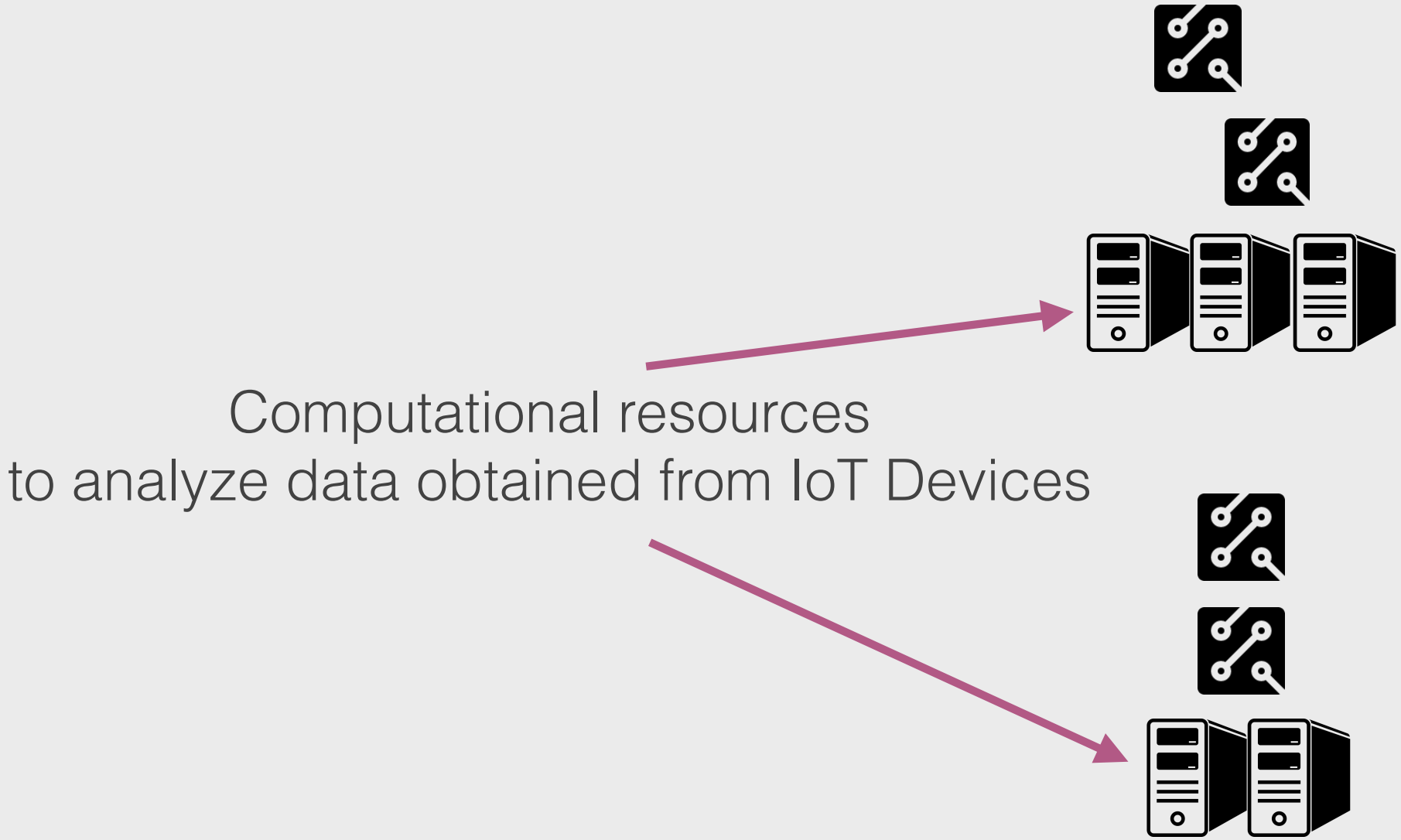

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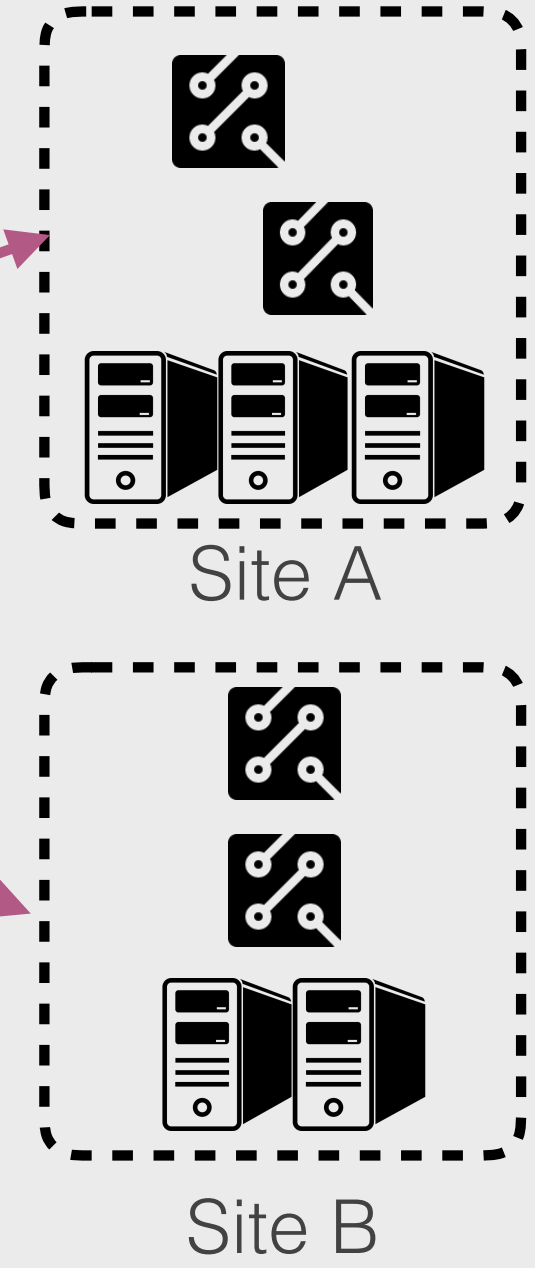
The IoT Era has arrived.

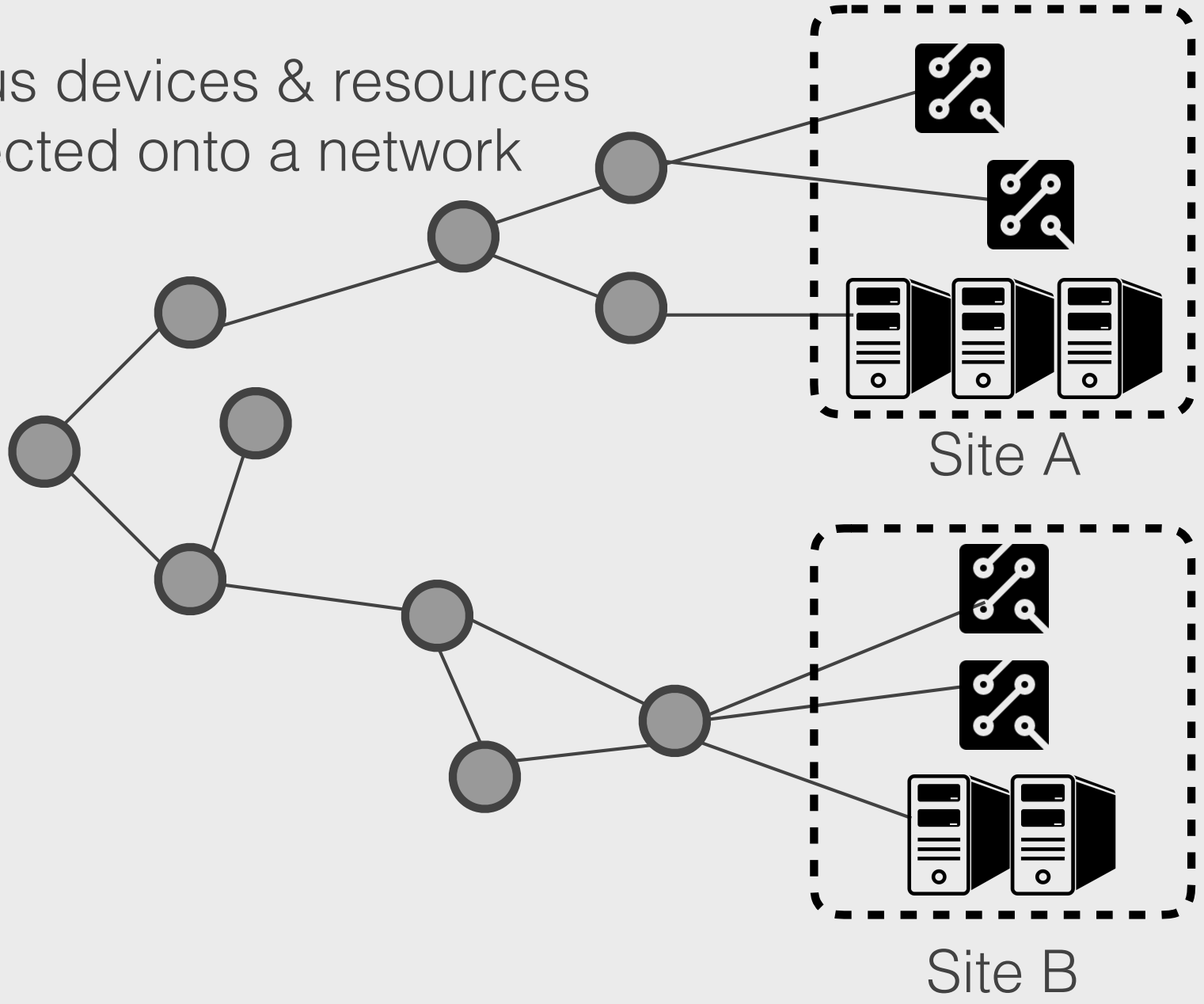
These devices & resources
are distributed spatially to multi-site



IoT Era

The IoT Era has arrived.

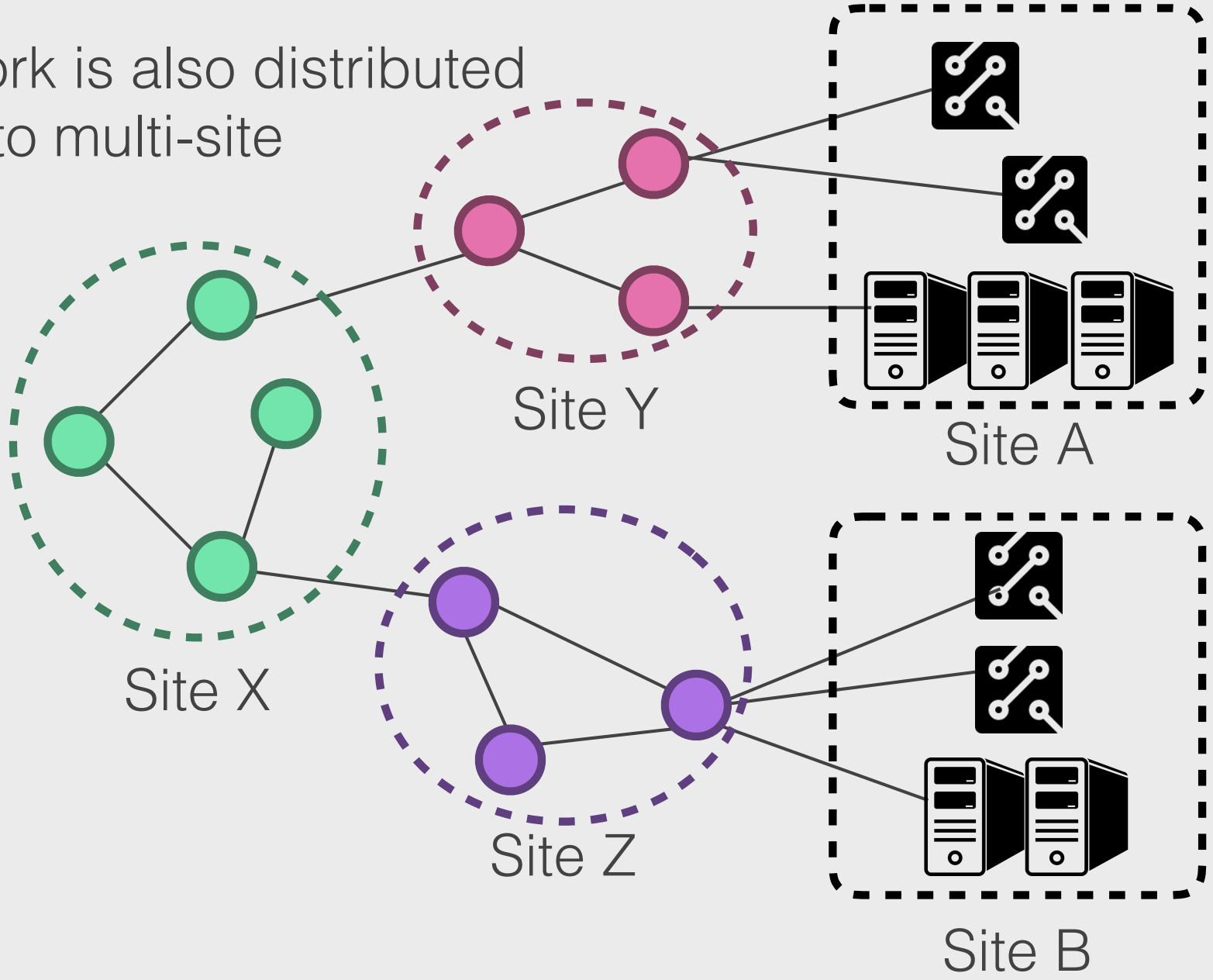
These various devices & resources are connected onto a network



IoT Era

The IoT Era has arrived.

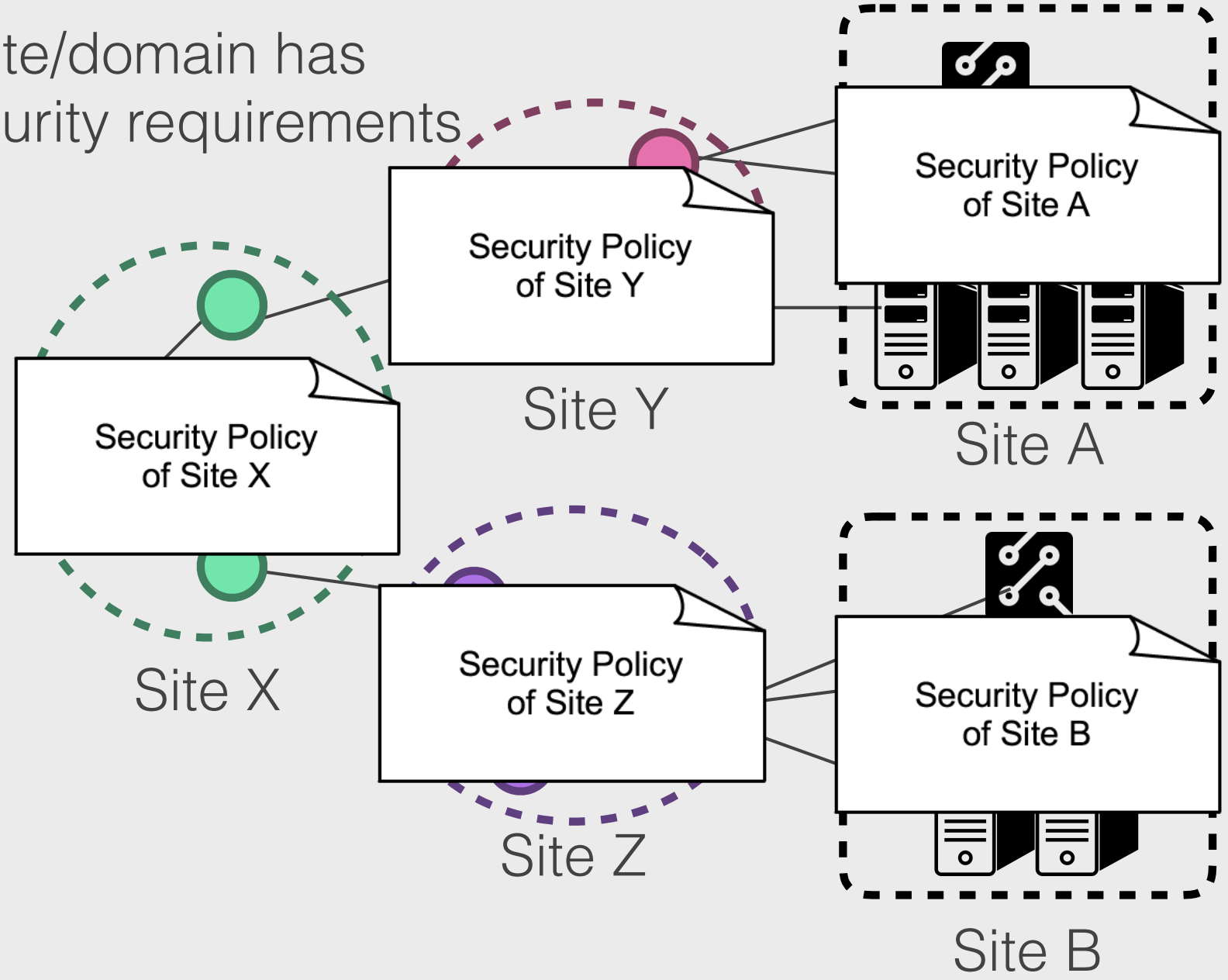
The network is also distributed to multi-site



IoT Era

The IoT Era has arrived.

Each site/domain has
unique security requirements



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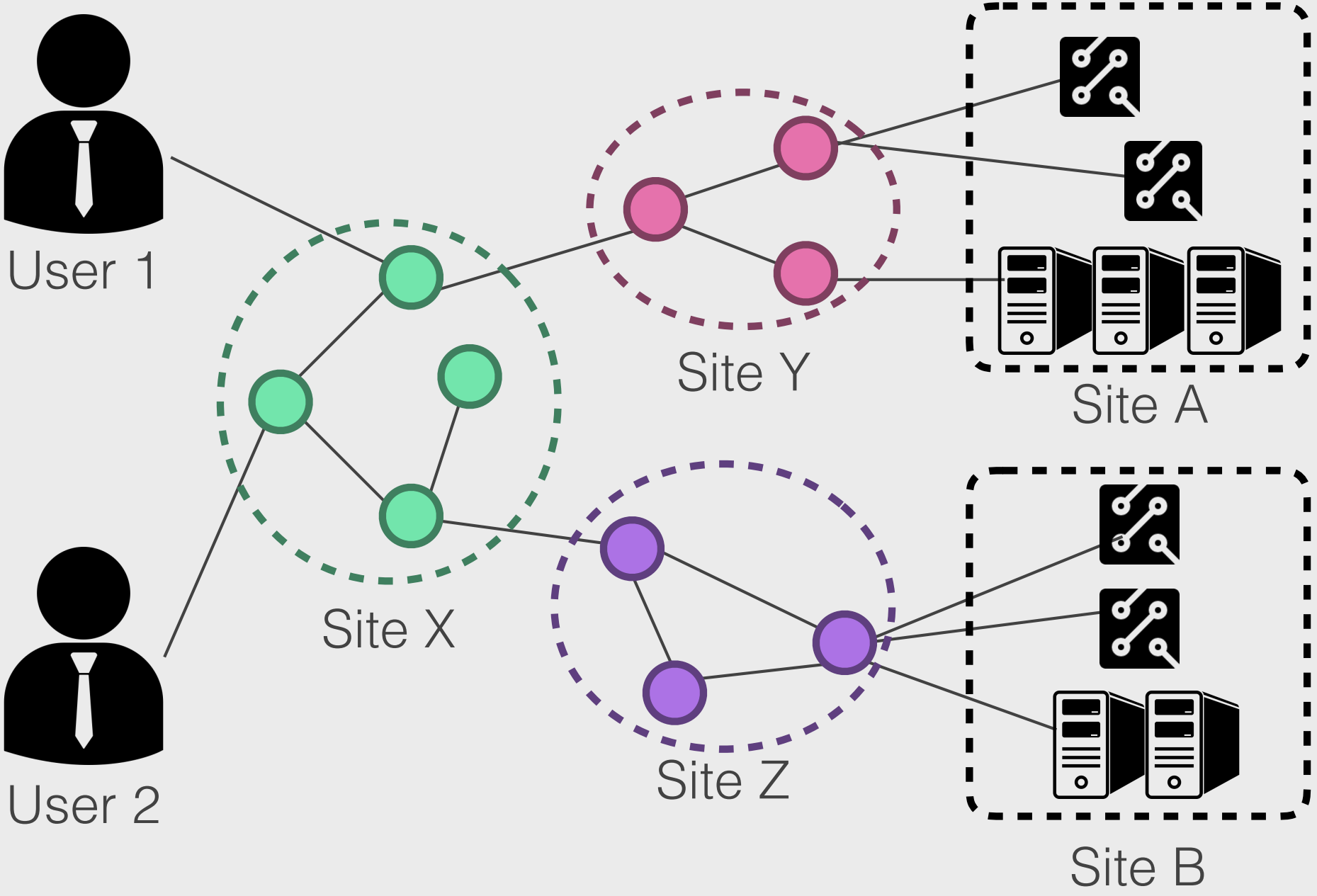

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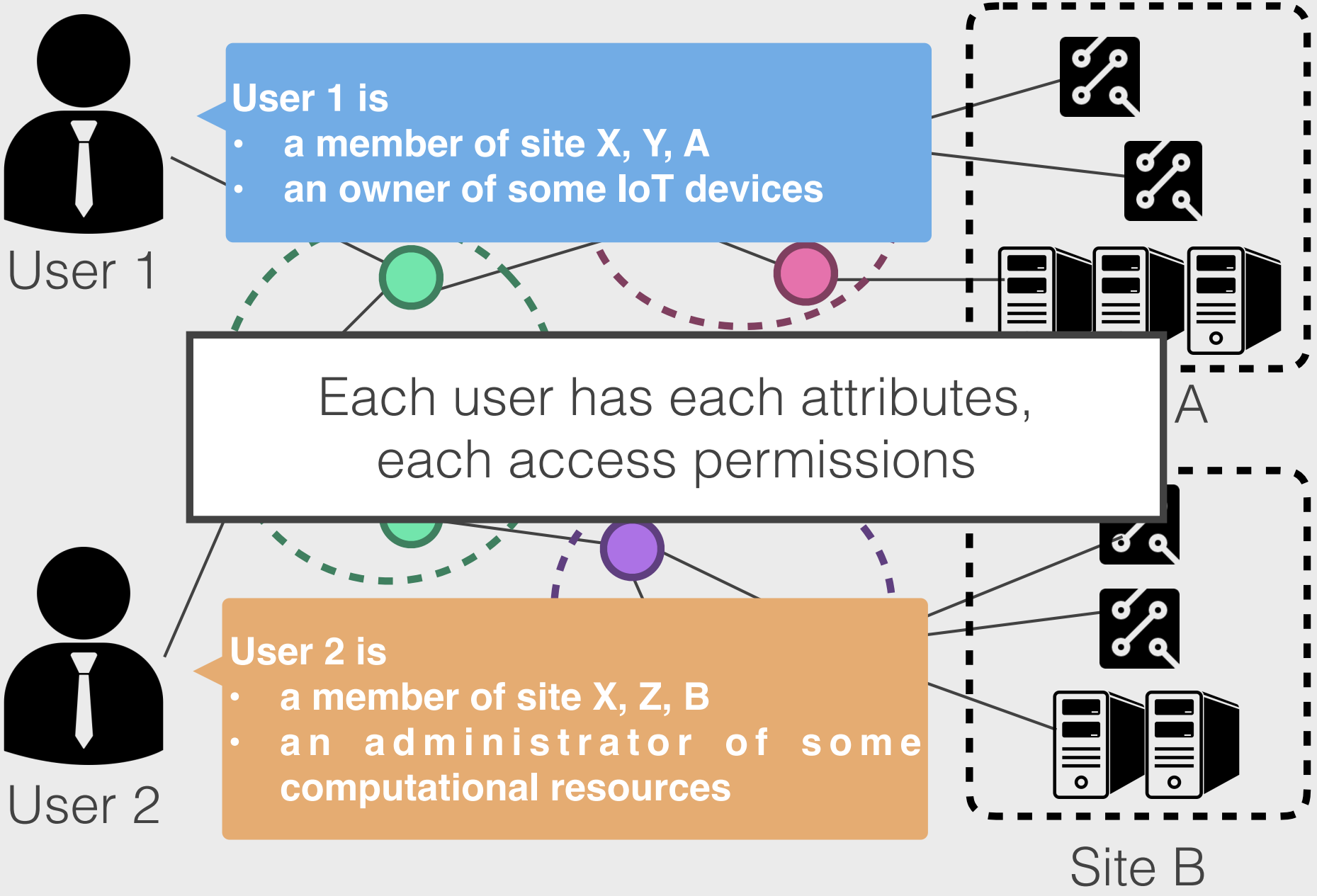

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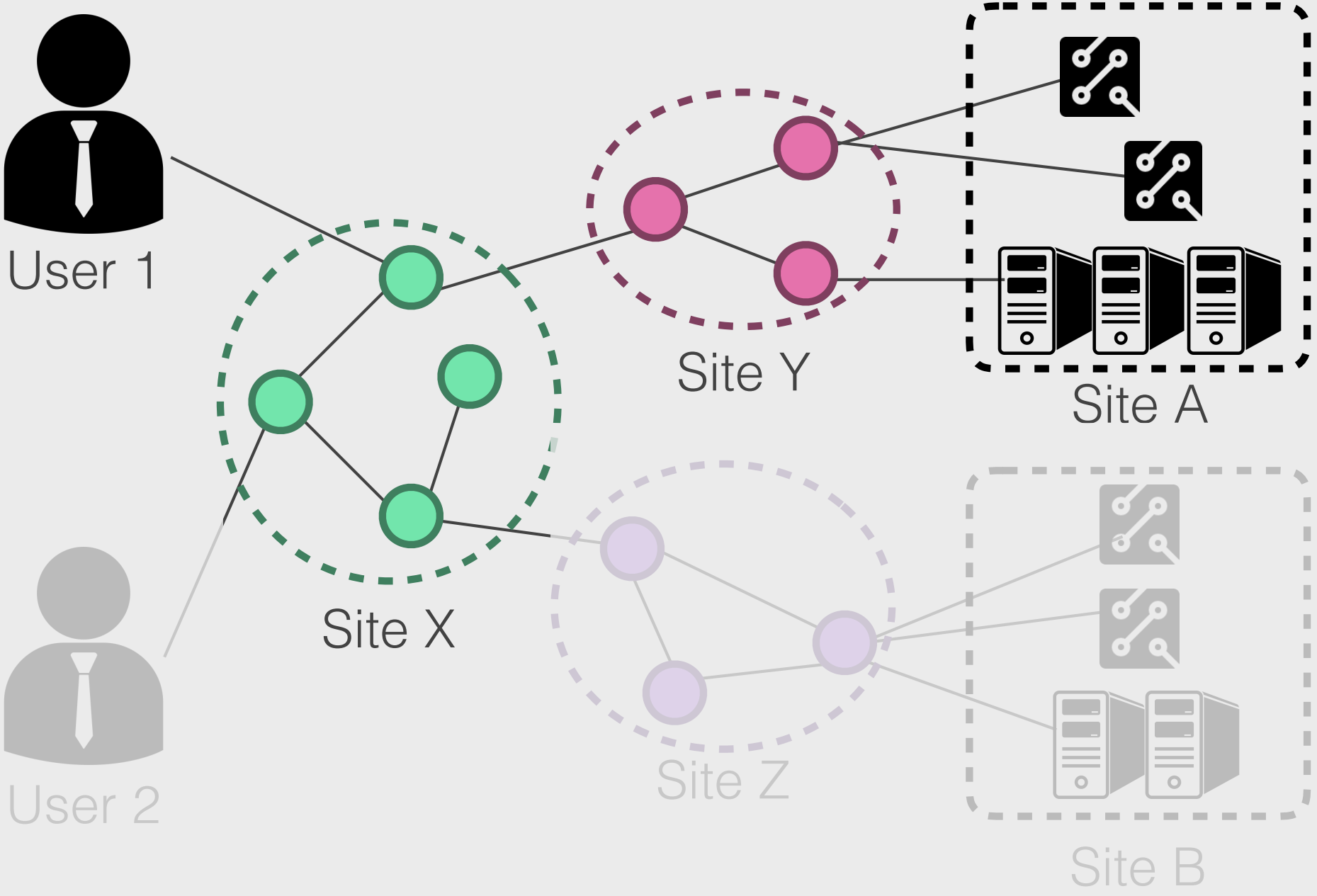

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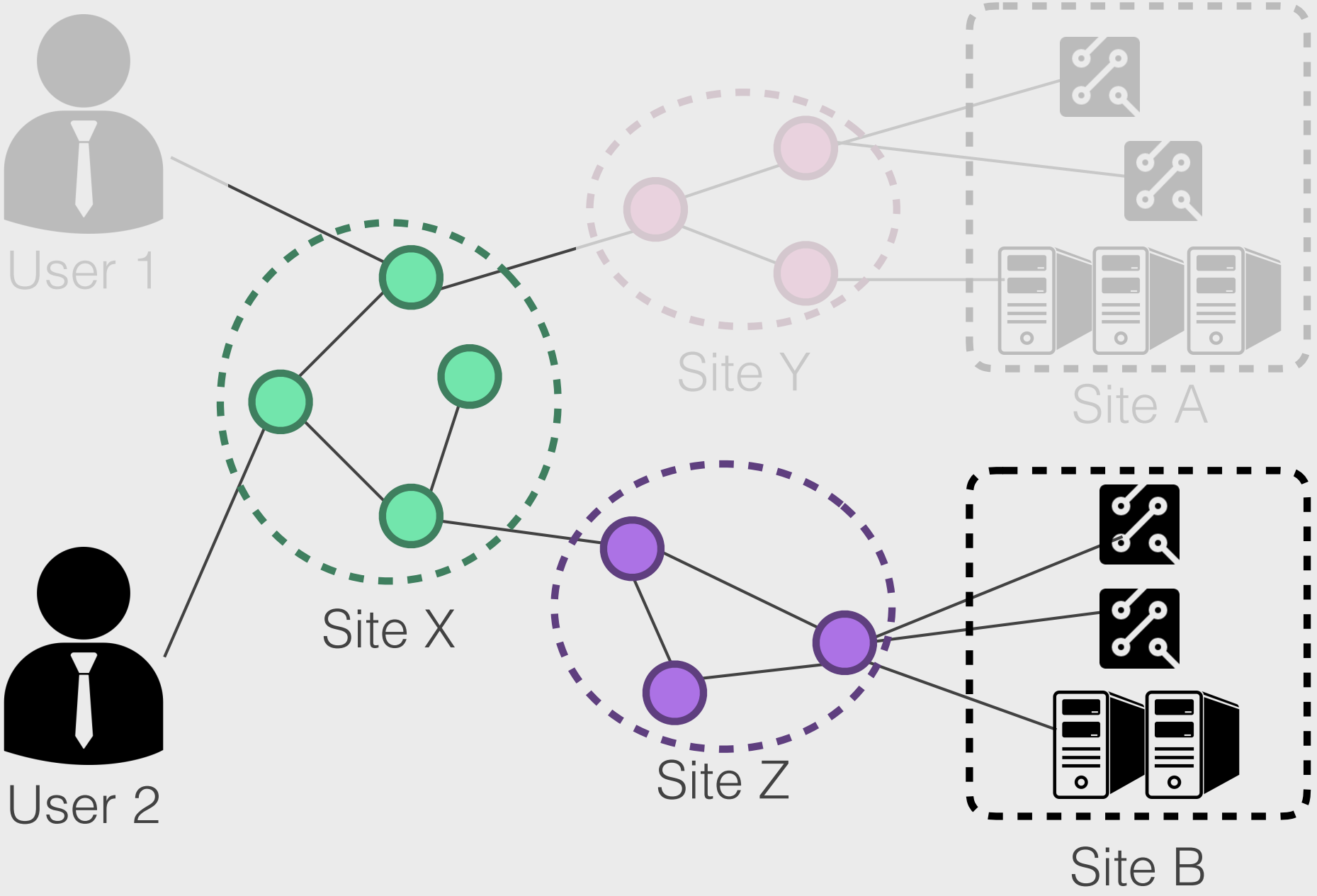
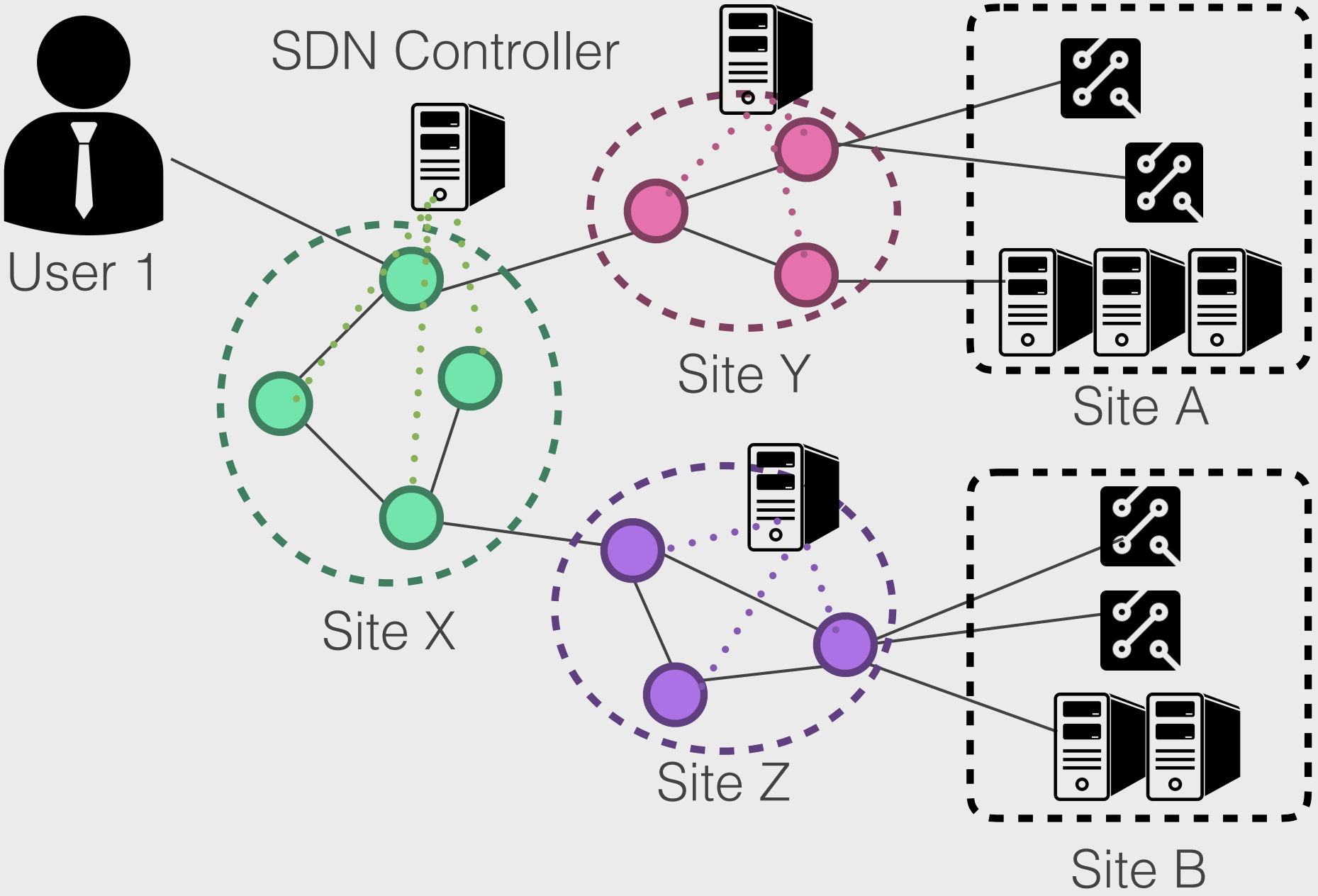


Access Control

Access control becomes an important problem.

- To date, various security technologies have been proposed. (e.g. GSI, Shibboleth, VOMS, …)
- However, these technologies have targeted only computational resources, not targeted network resources as access-controlled resources.
- **We proposed an access control mechanism that targets network resources as access-controlled resources**.
  - We have adopted **SDN** & **RBAC (Role Based Access Control)** to develop the mechanism.

Proposed Mechanism



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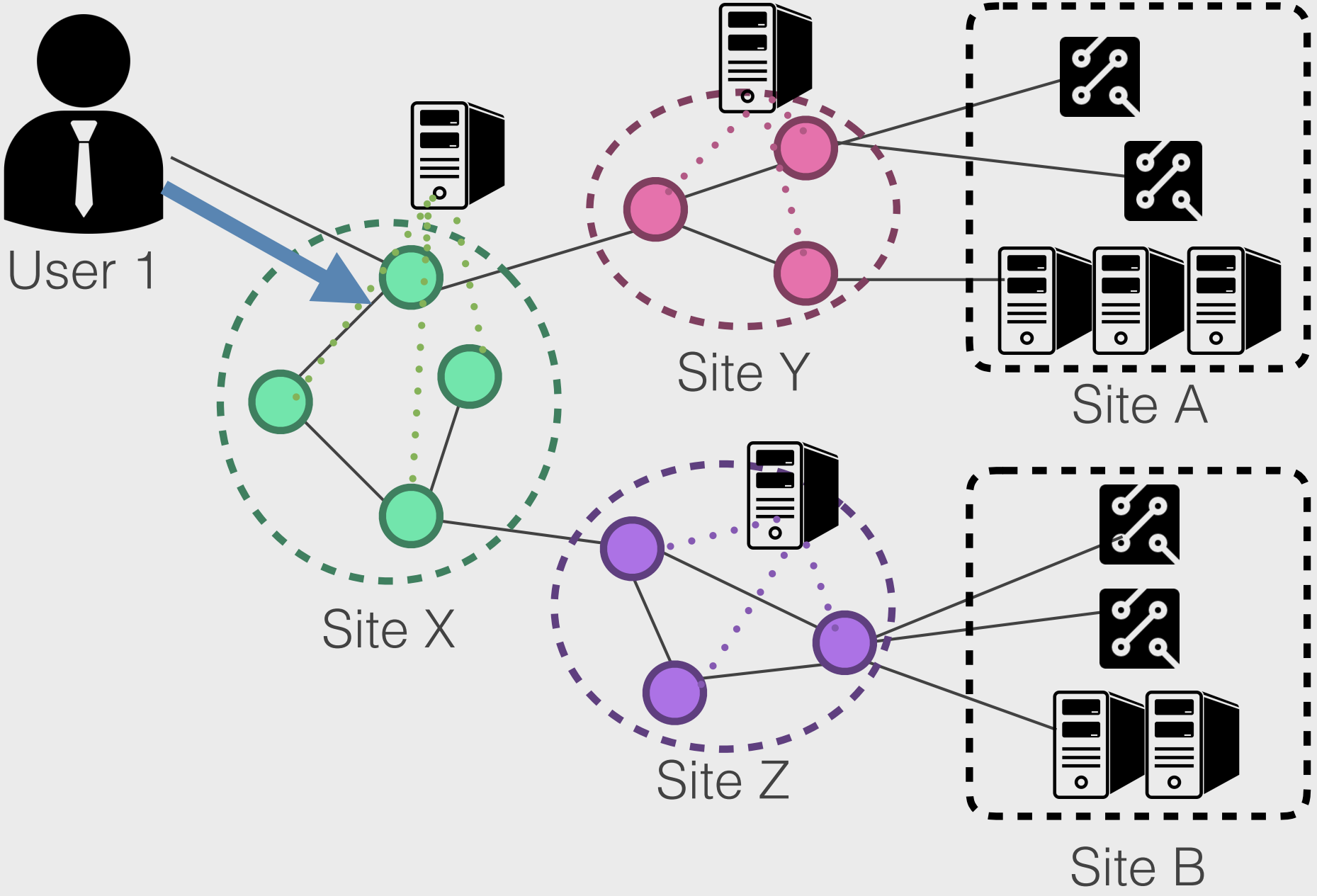

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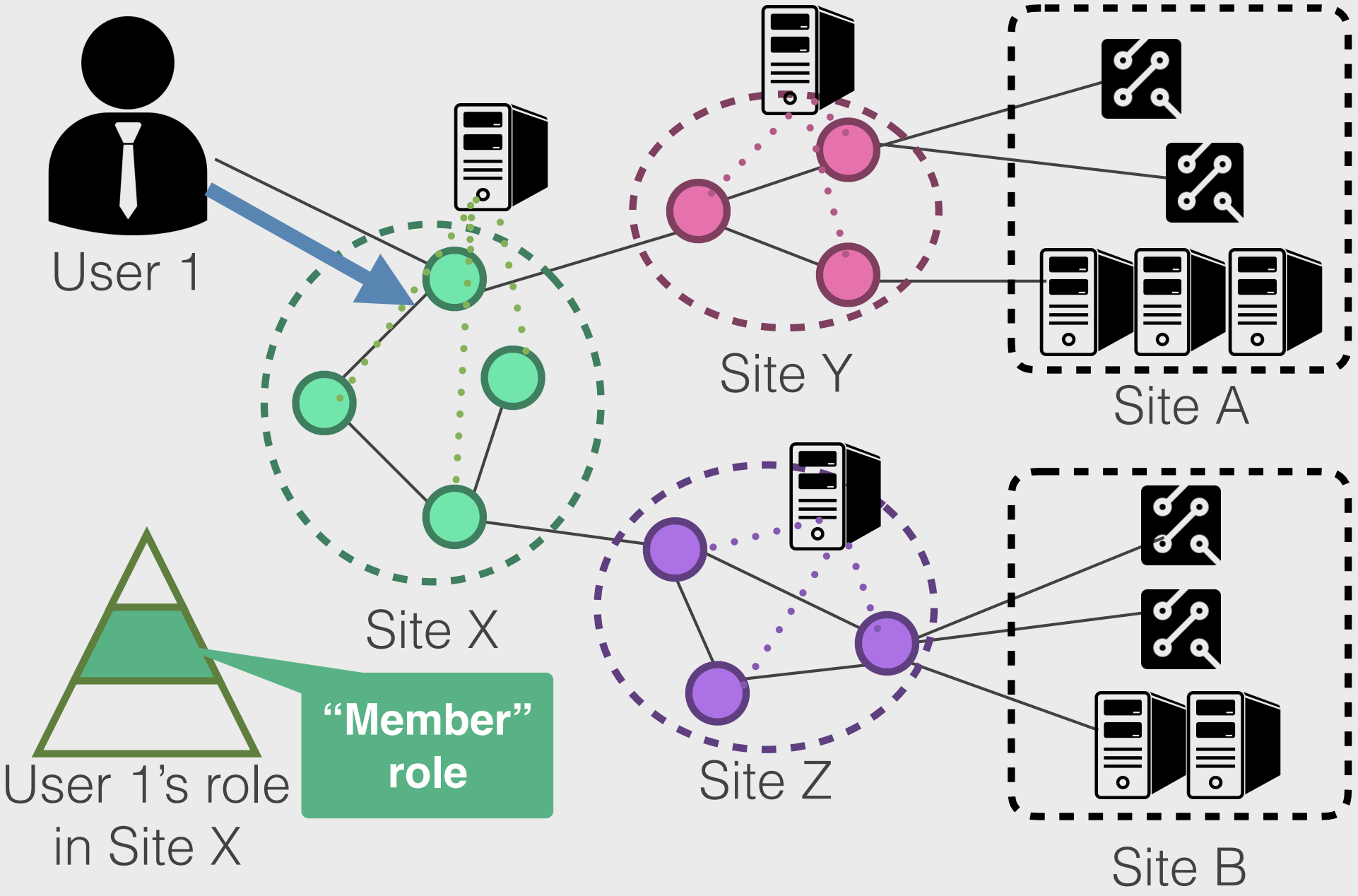

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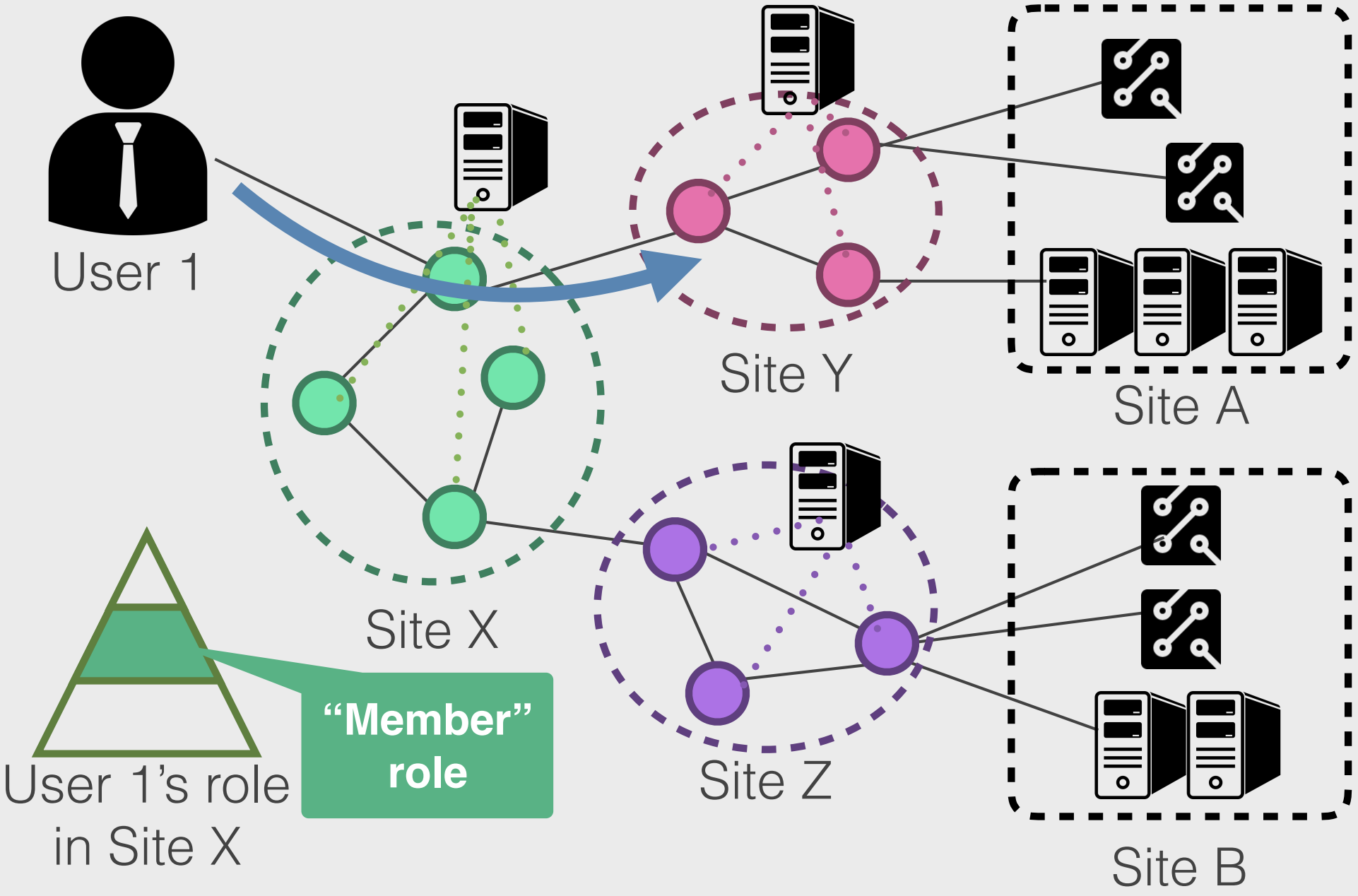

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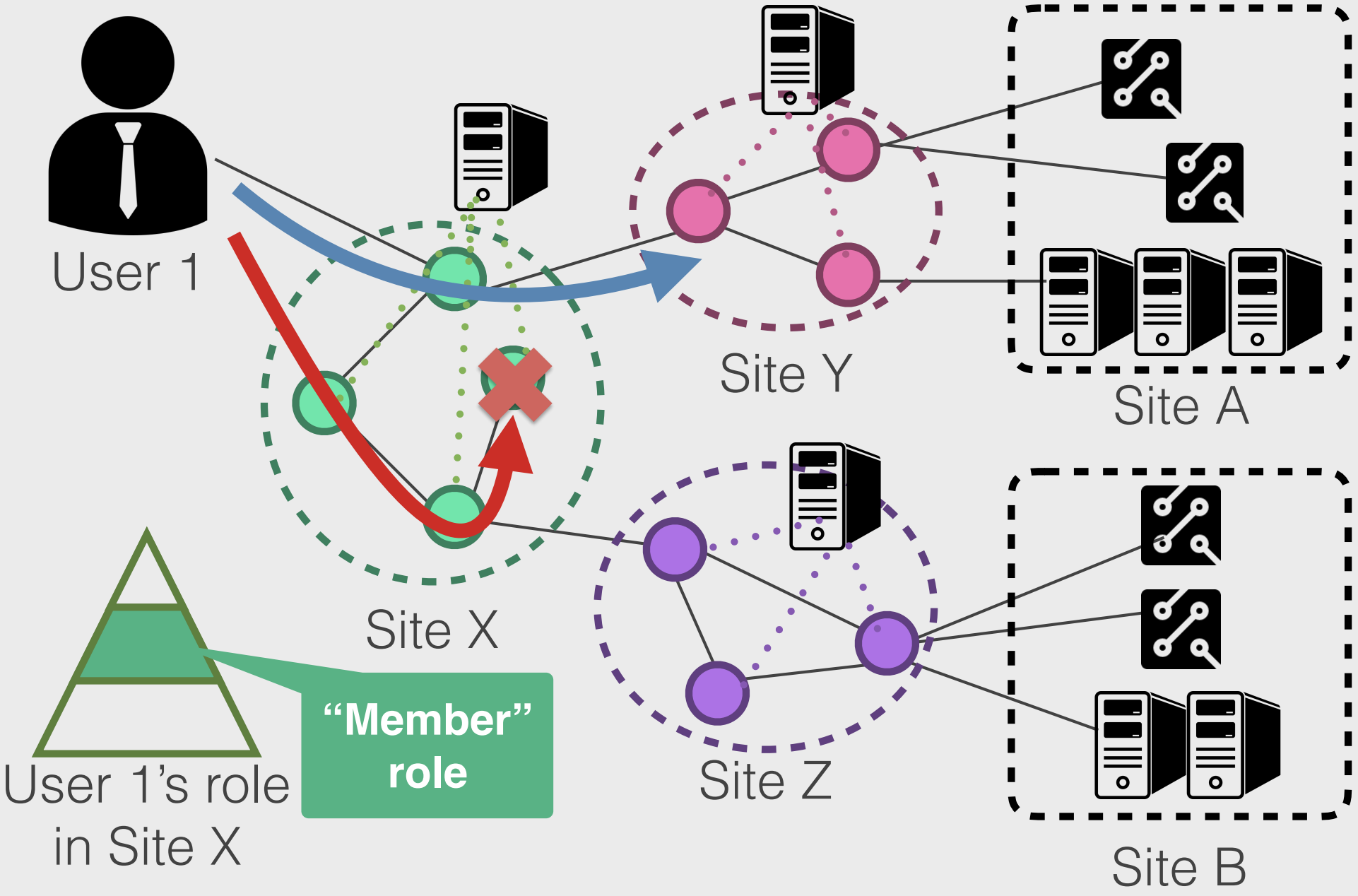

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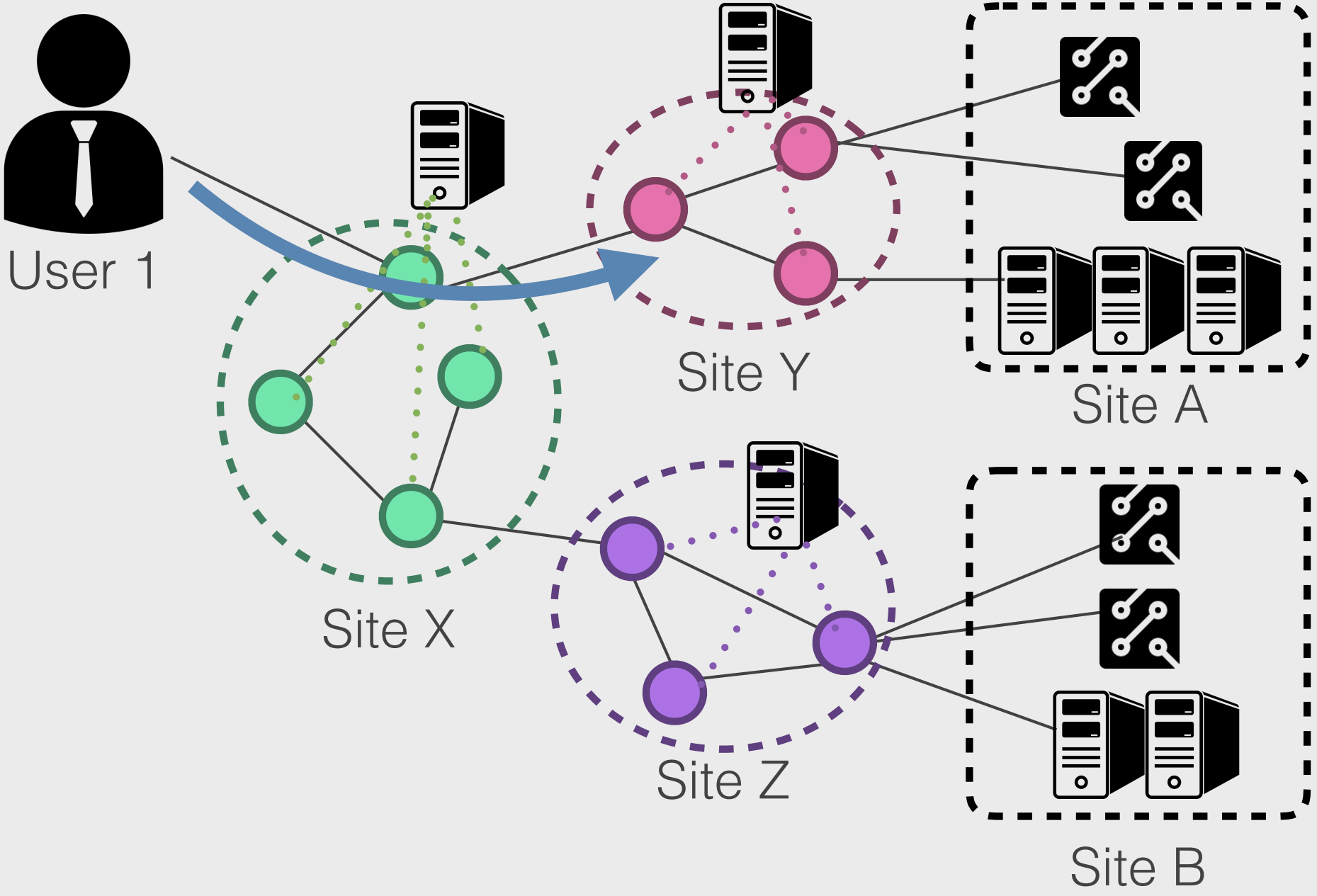

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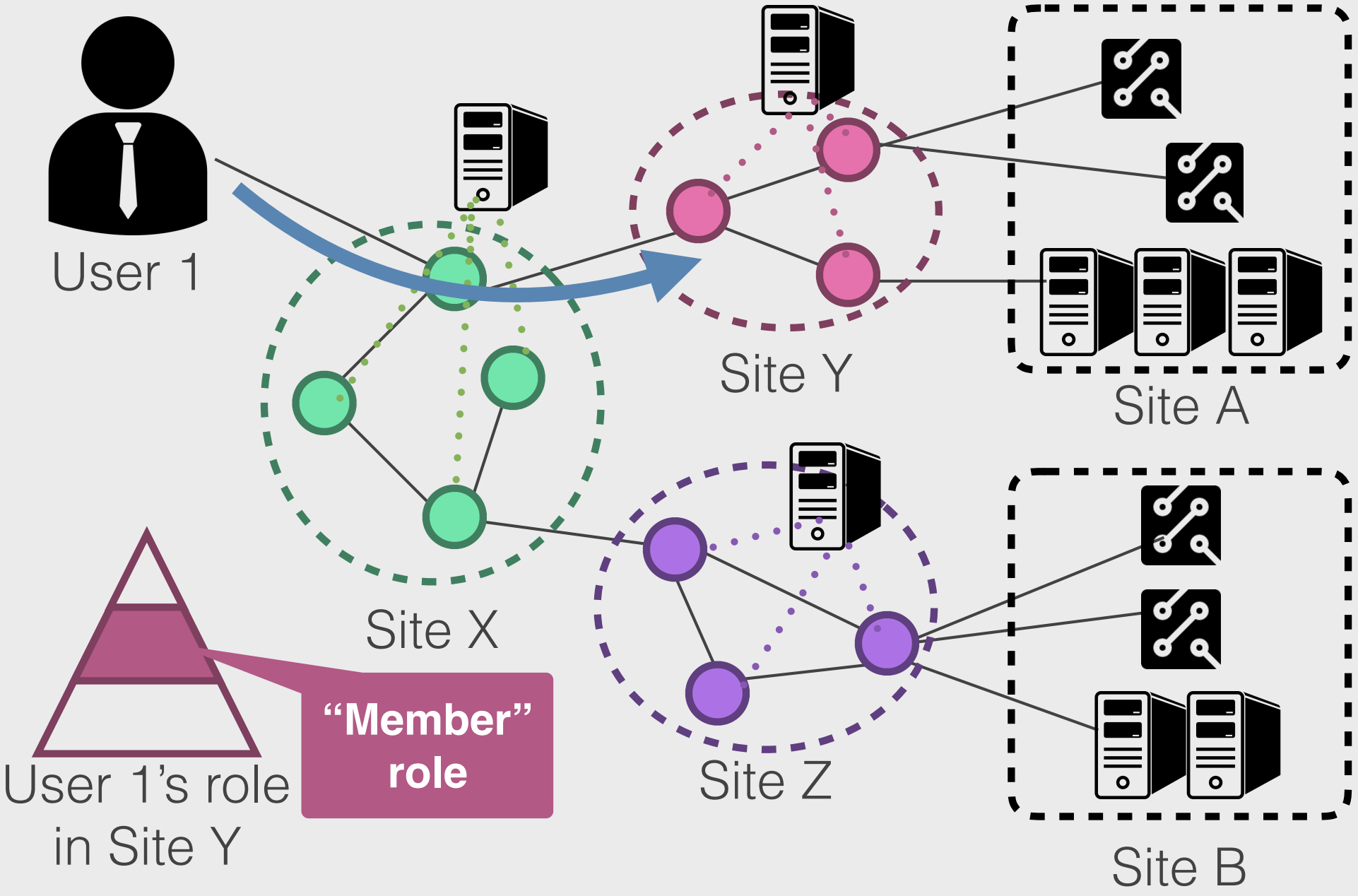

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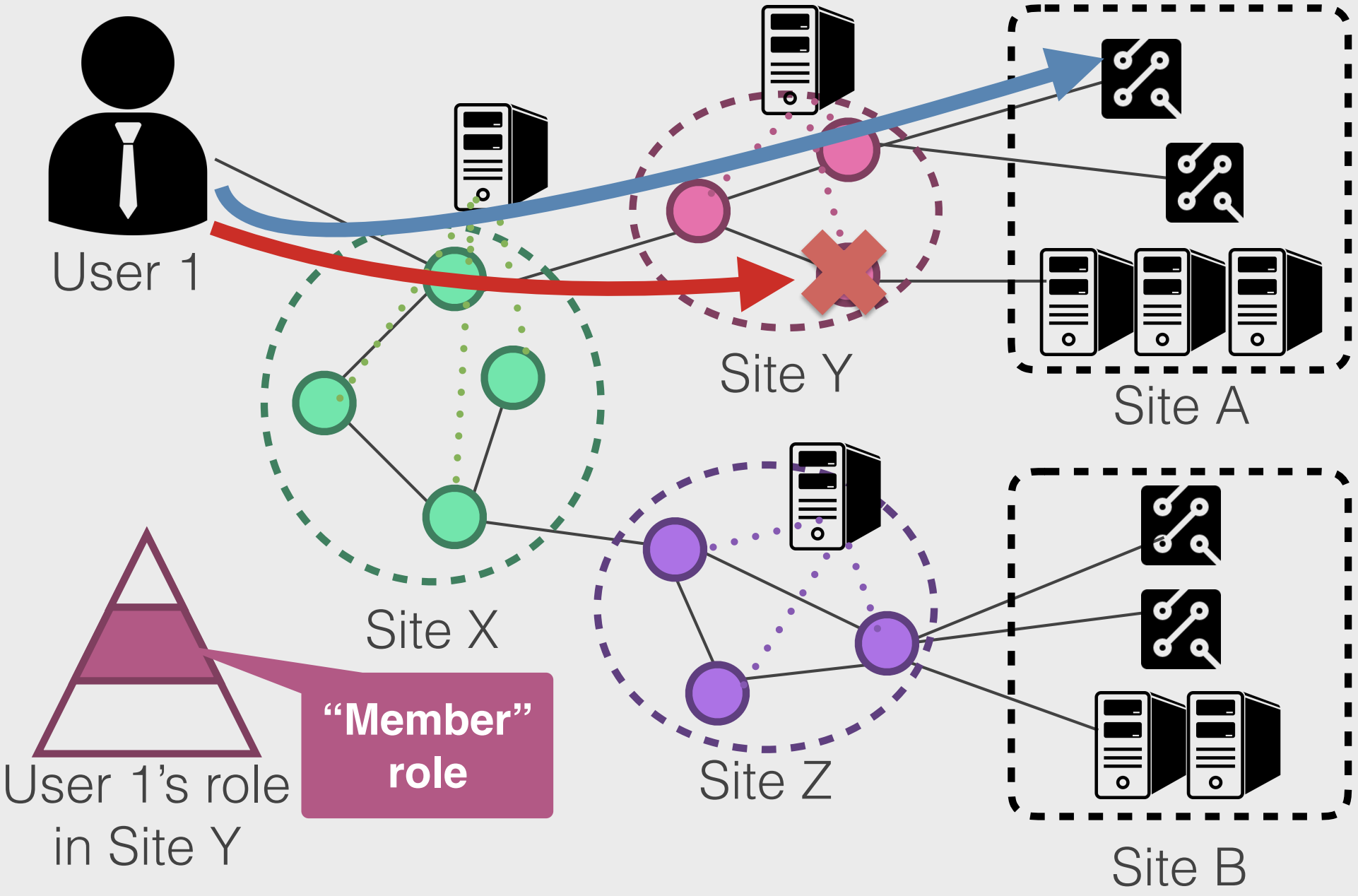

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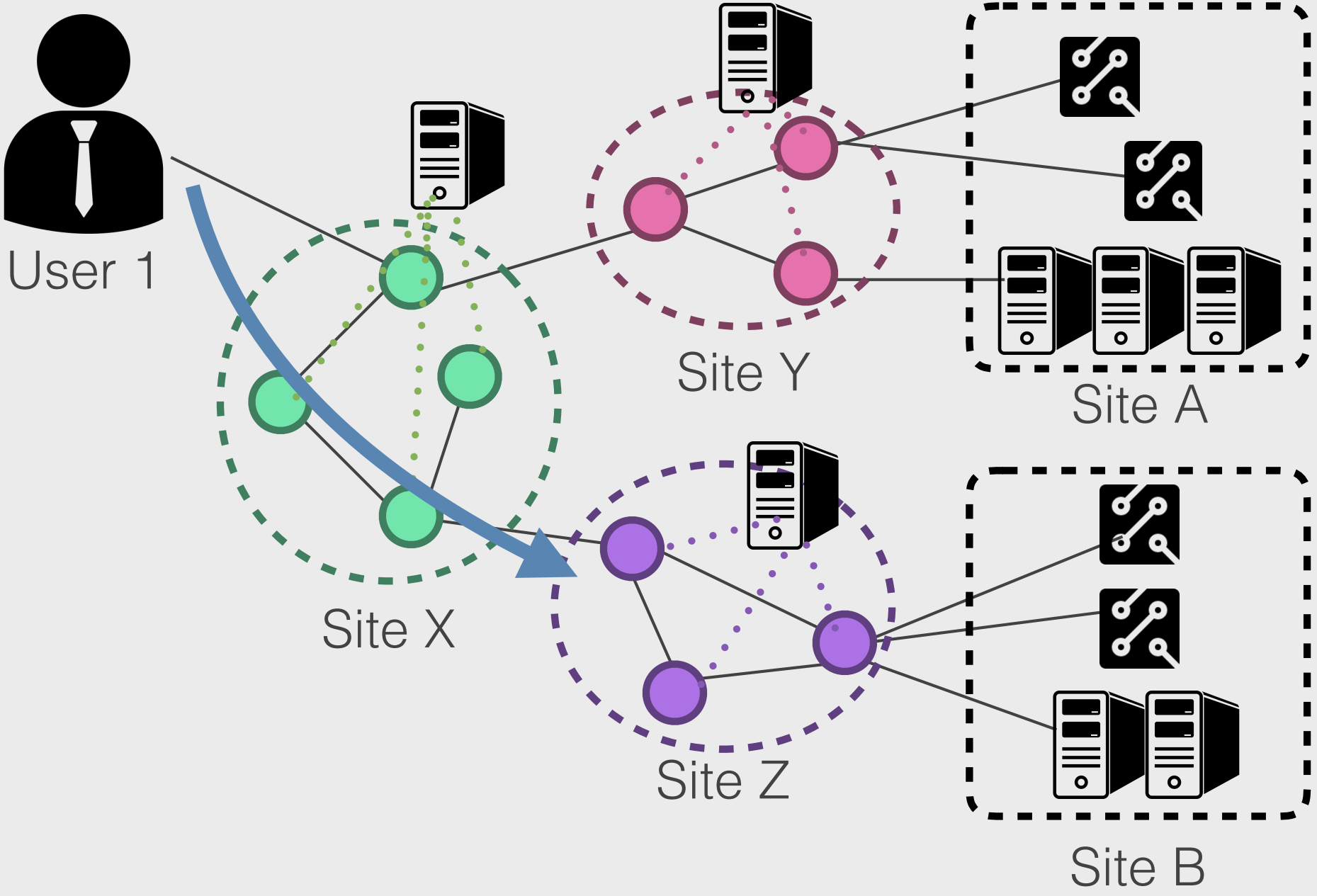

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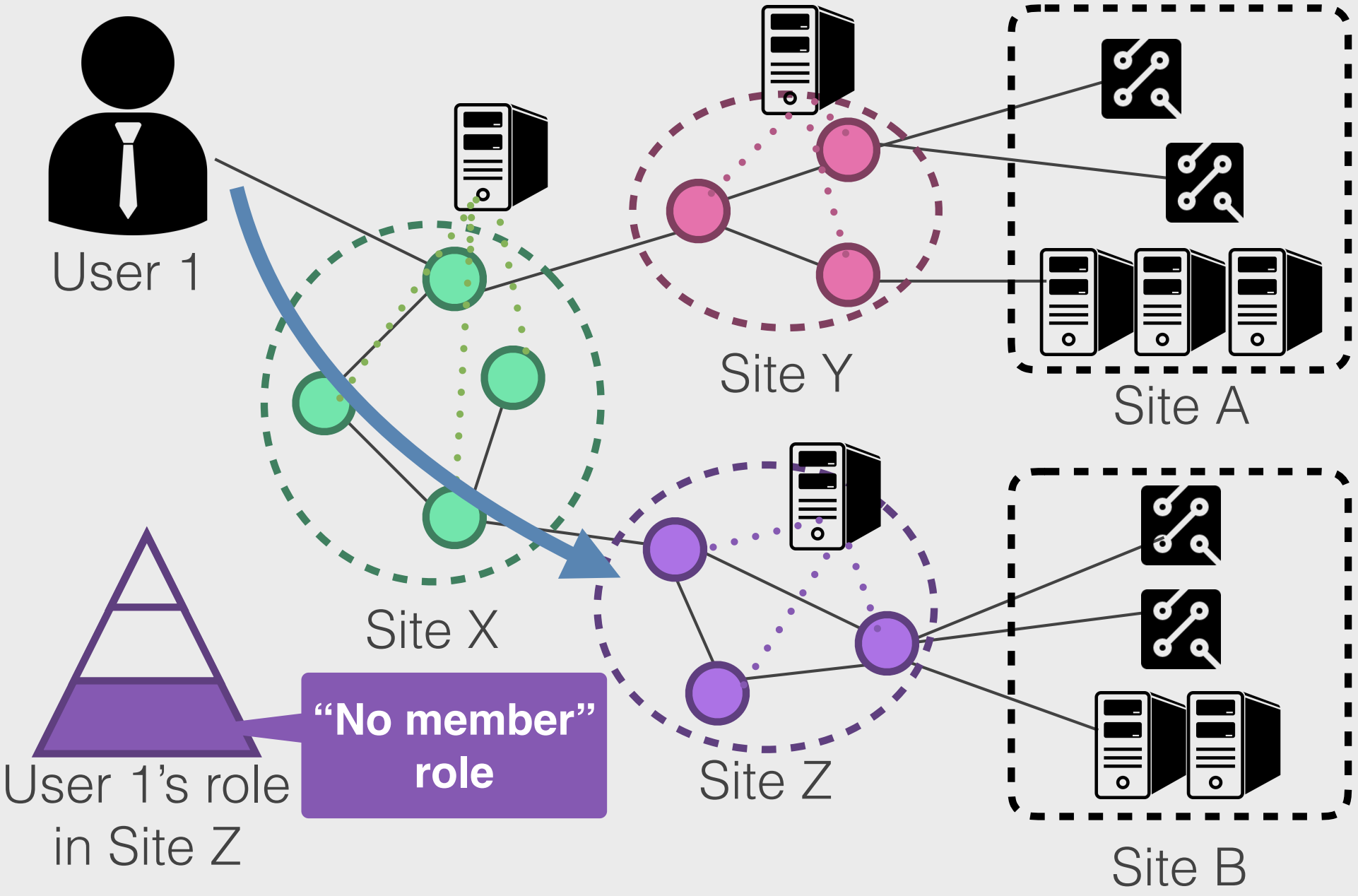

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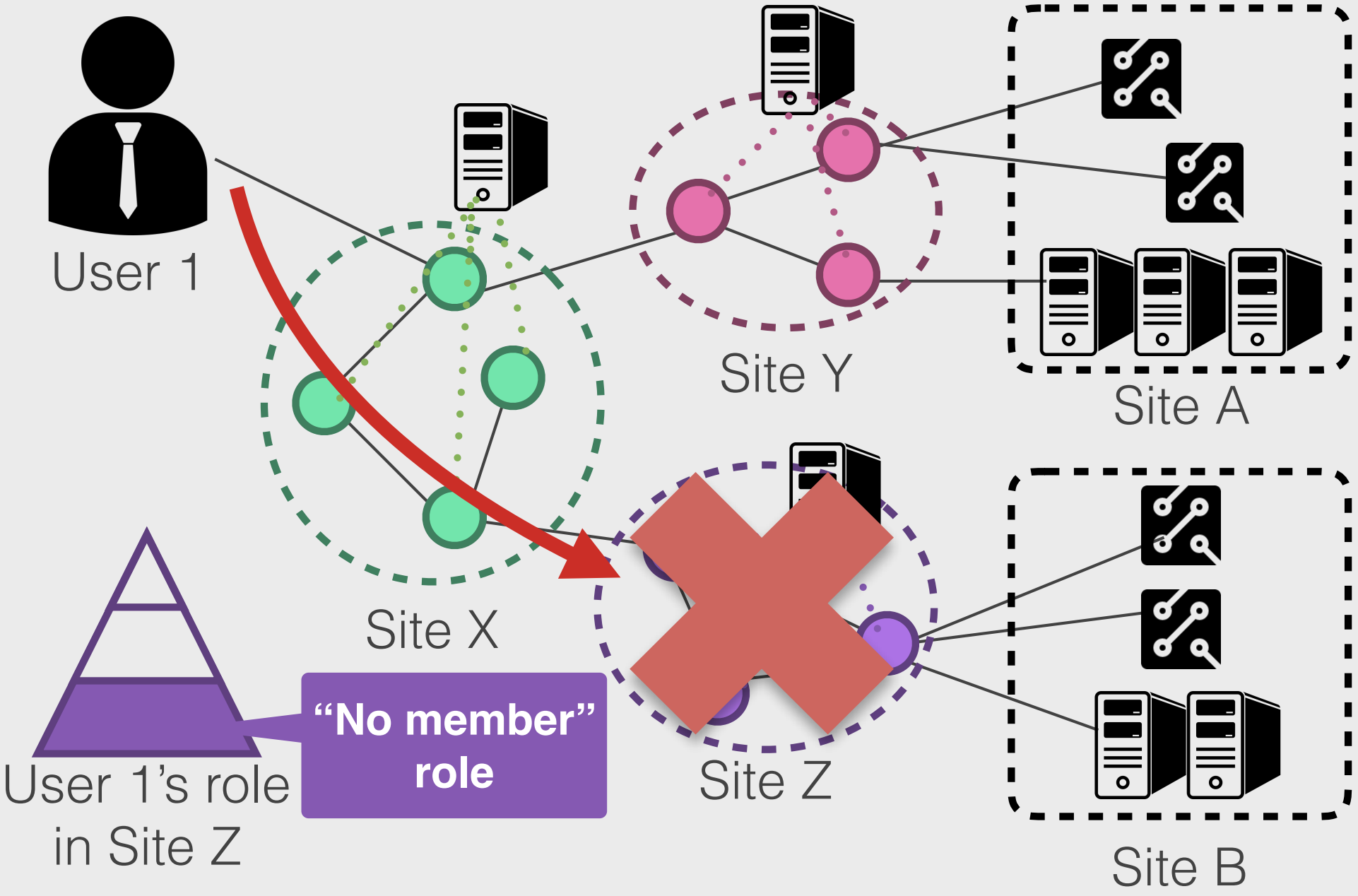

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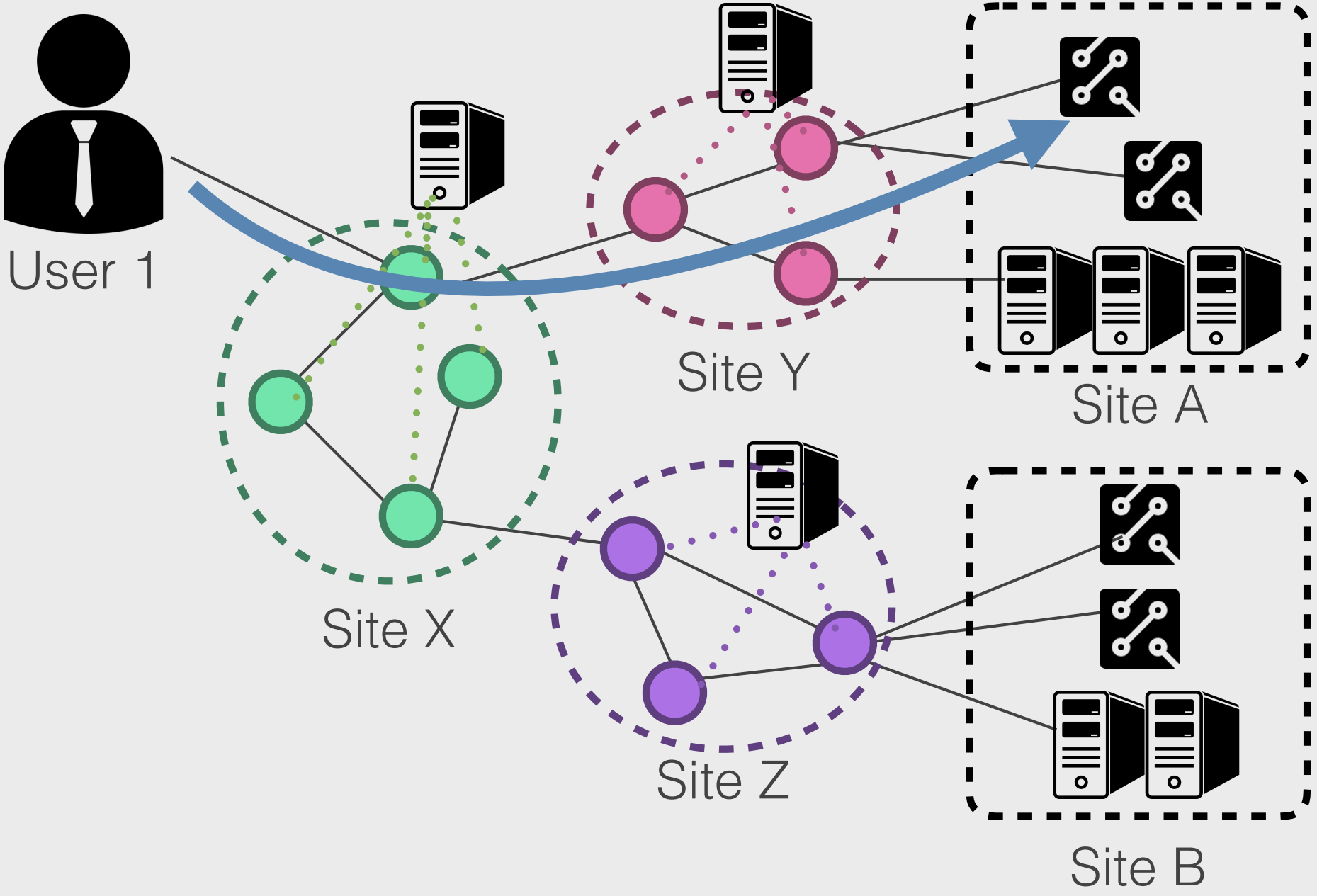

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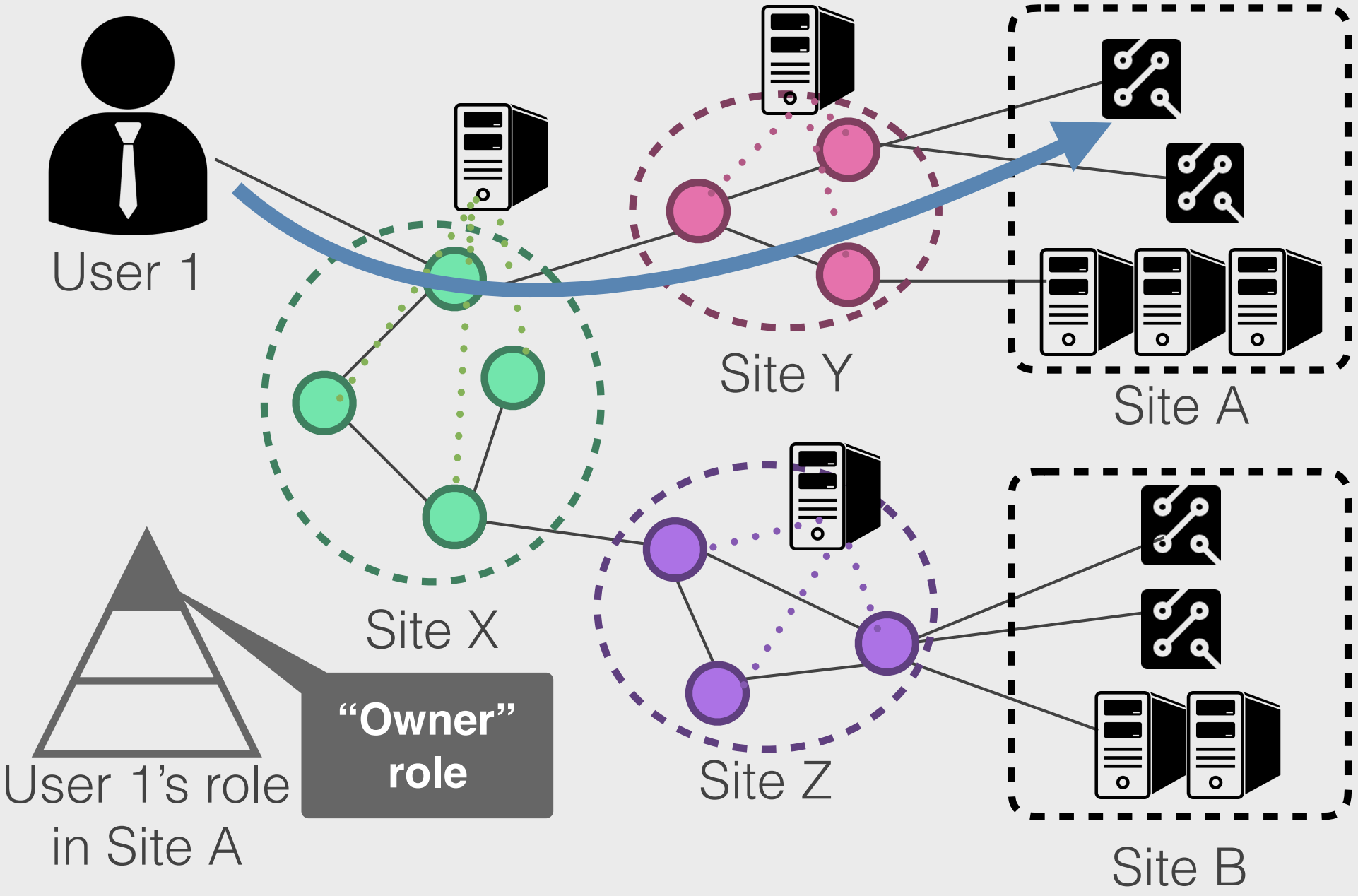
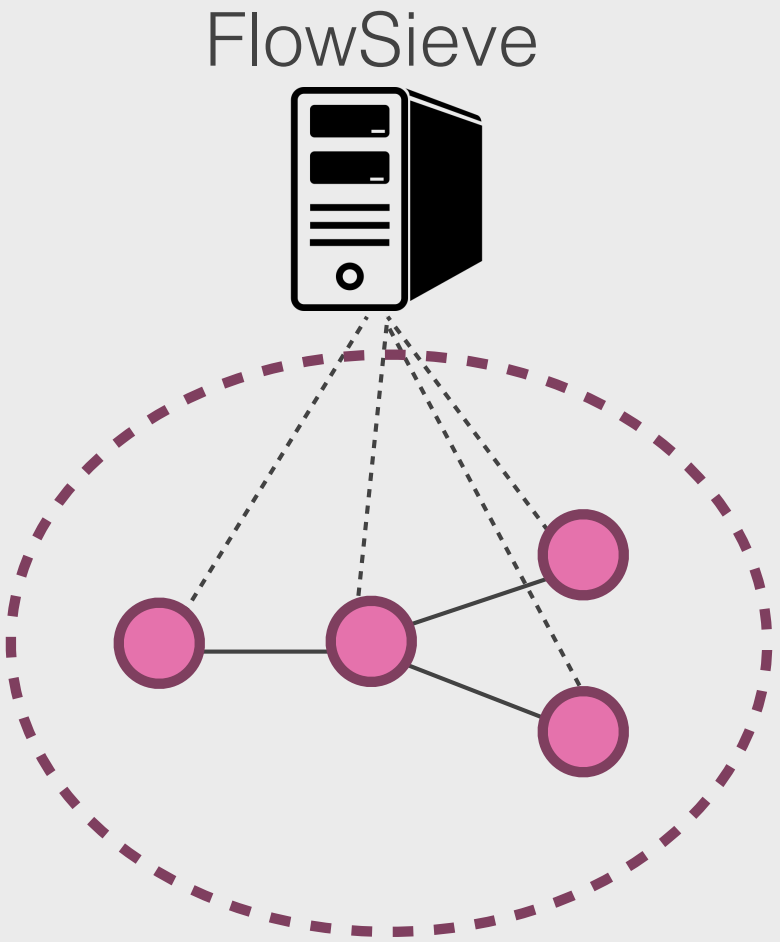


FlowSieve

FlowSieve is a preliminary implementation of the access control mechanism.

- FlowSieve is implemented as an OpenFlow controller program.
- FlowSieve authenticates users (based on IEEE 802.1X standard), and authorizes access from users to network resources in an OpenFlow network.

FlowSieve in Action



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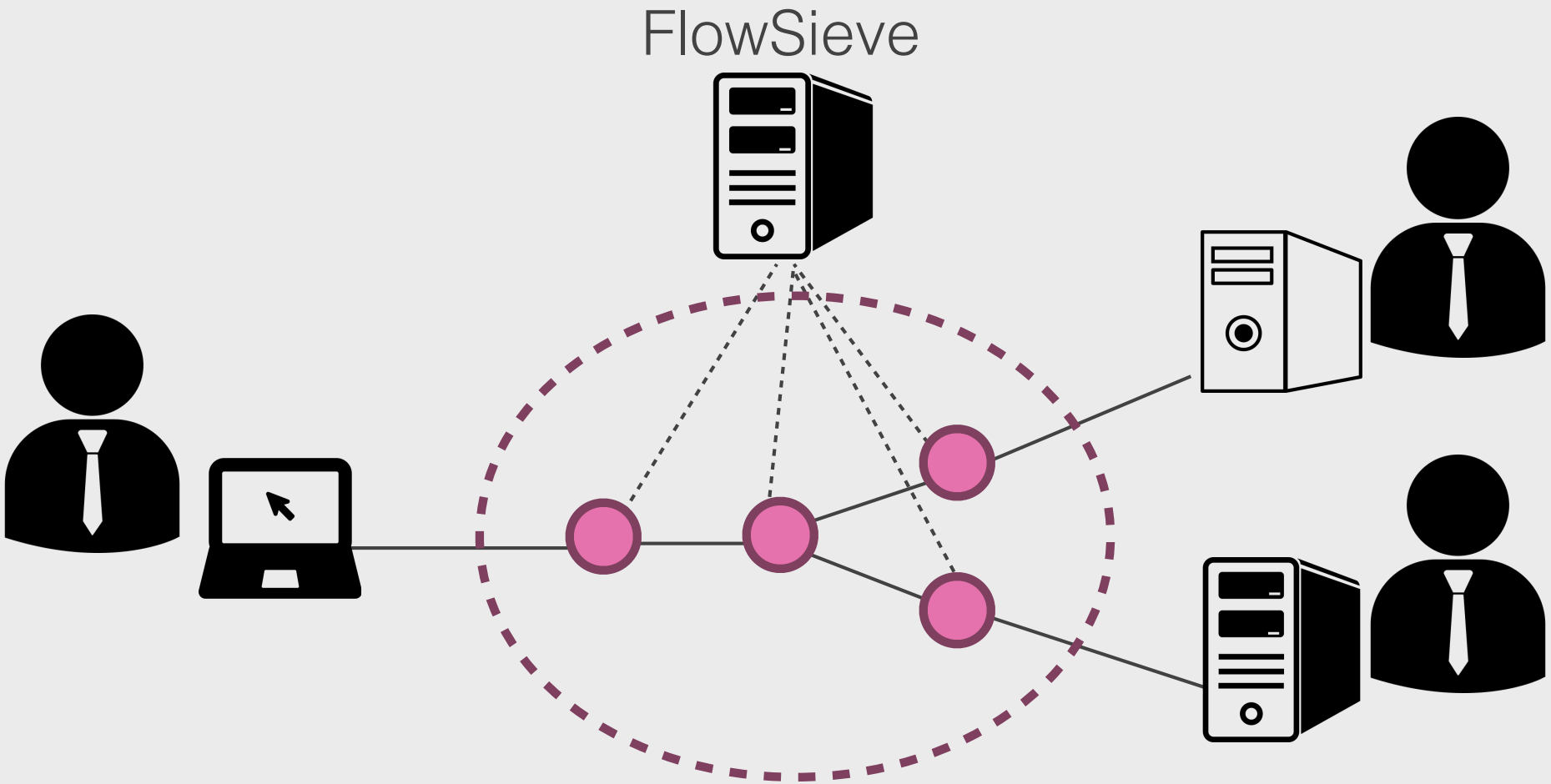

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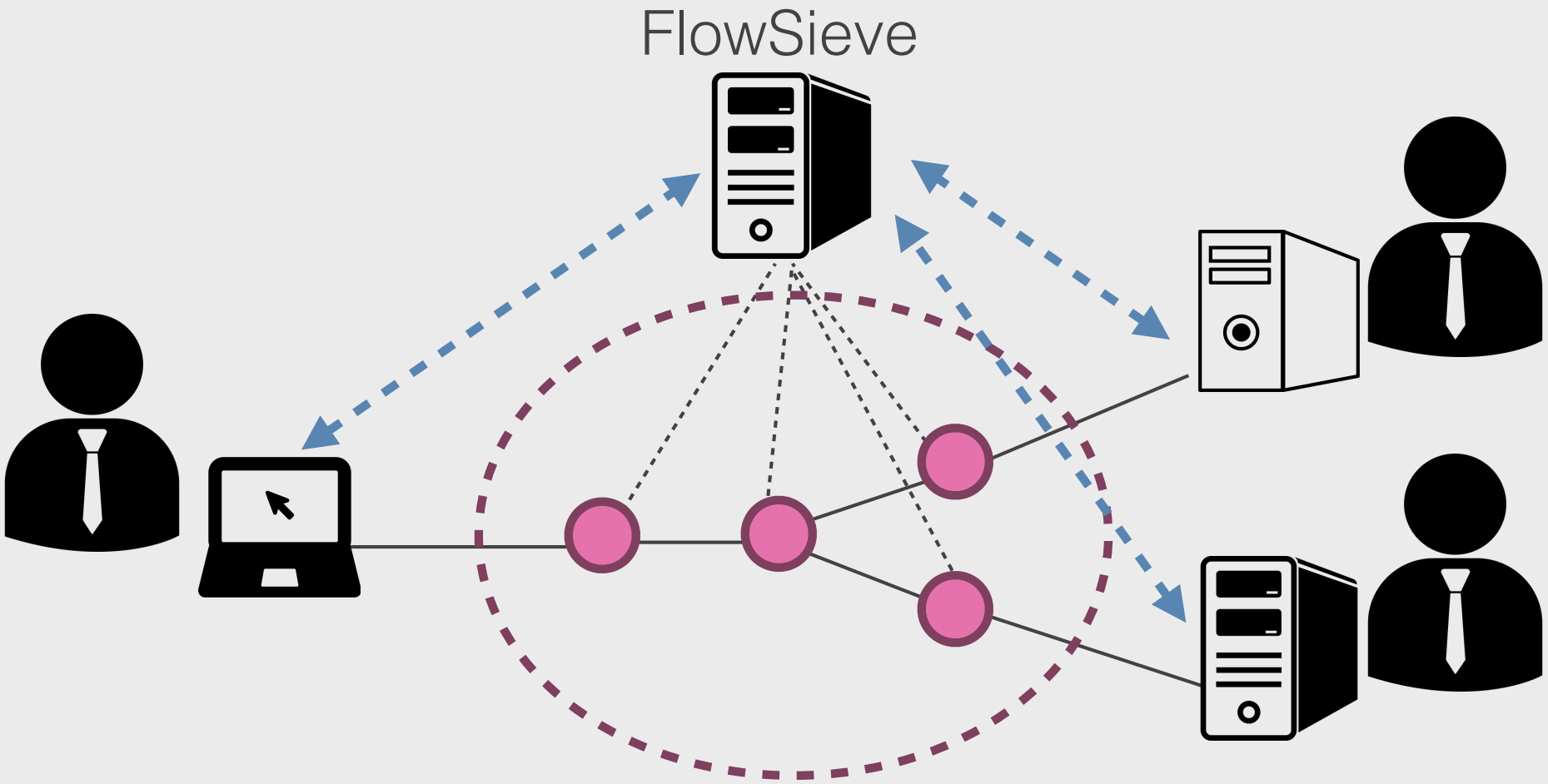

FlowSieve works as 802.1X authentication Server, authenticates every user

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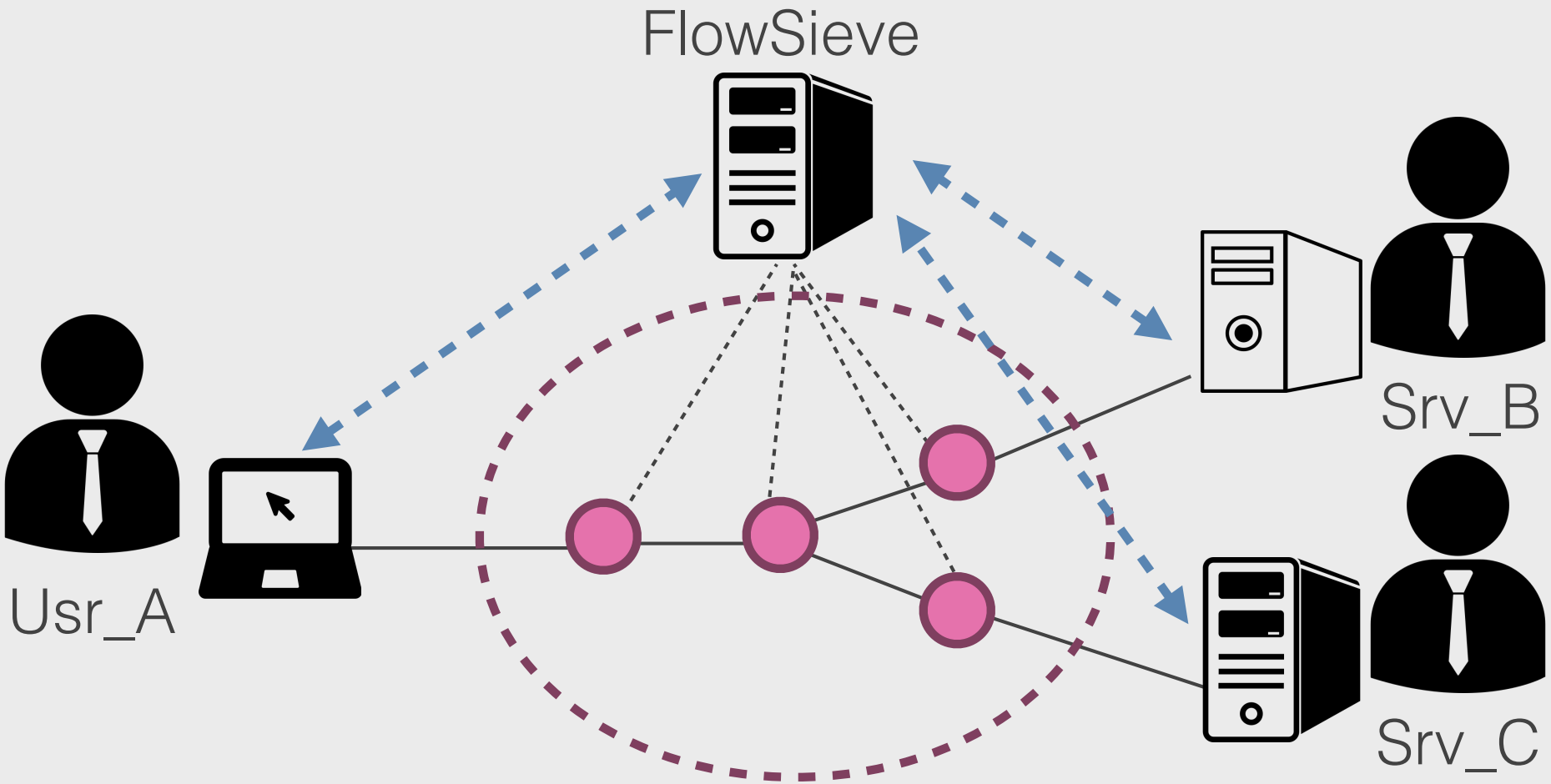

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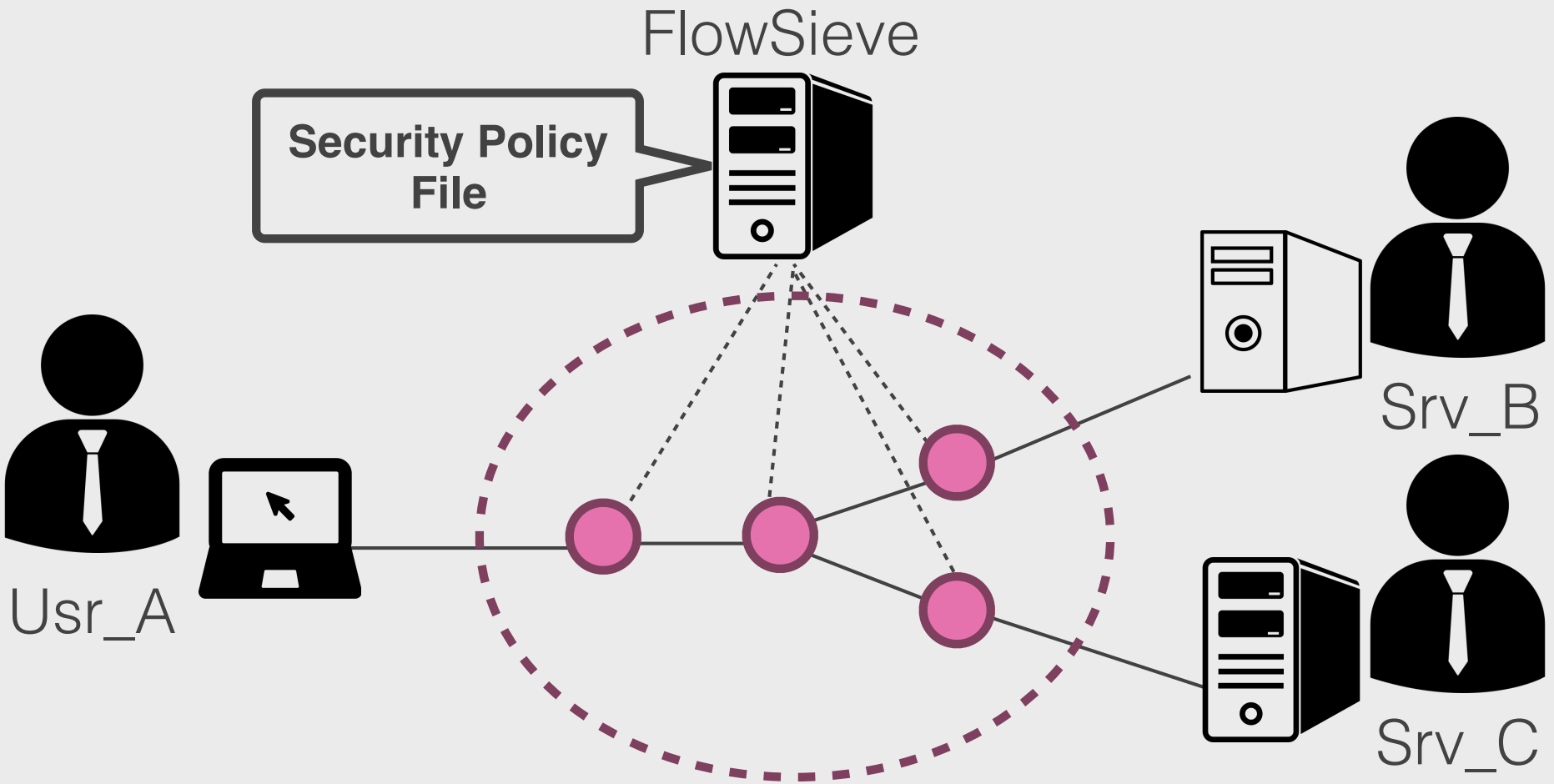

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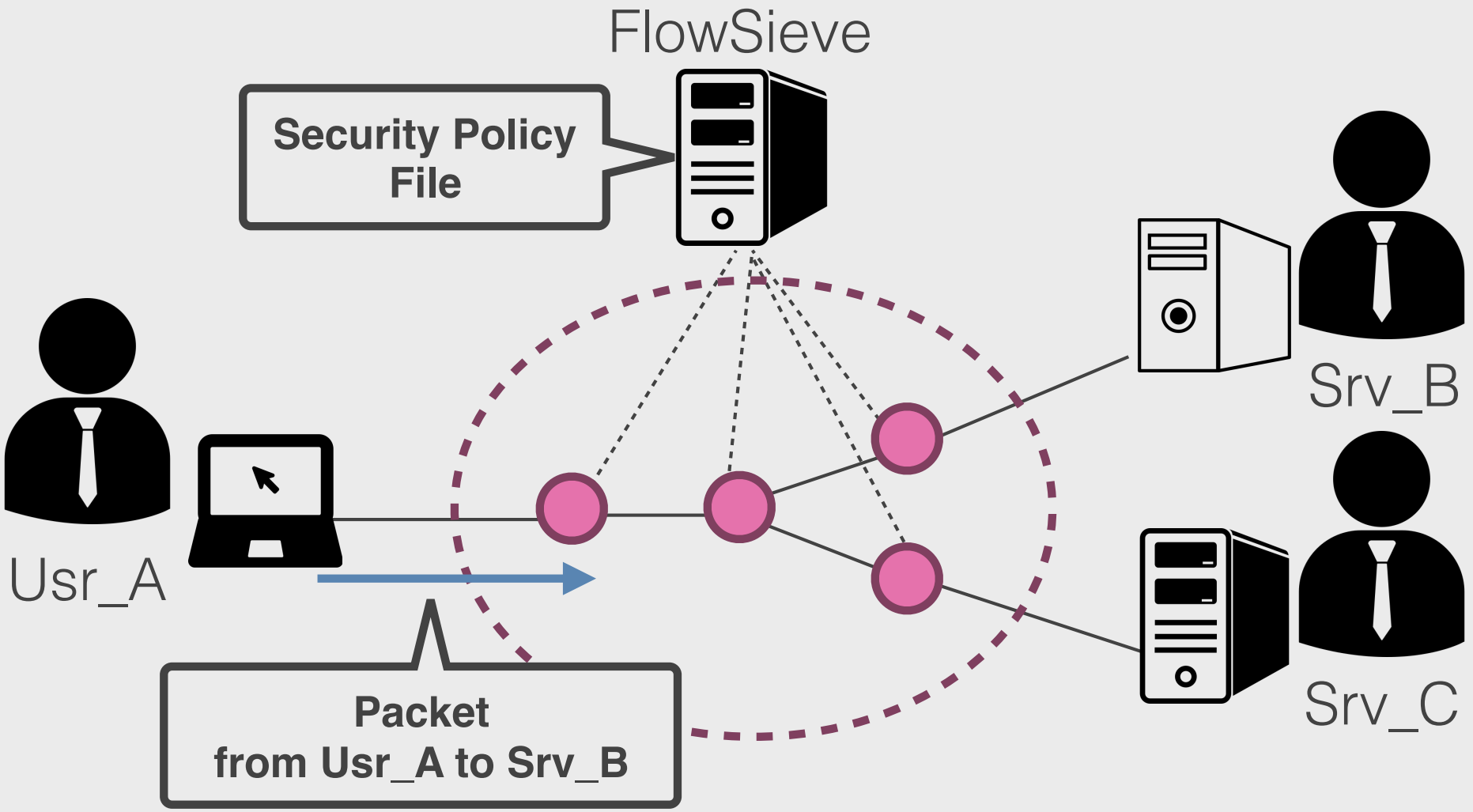
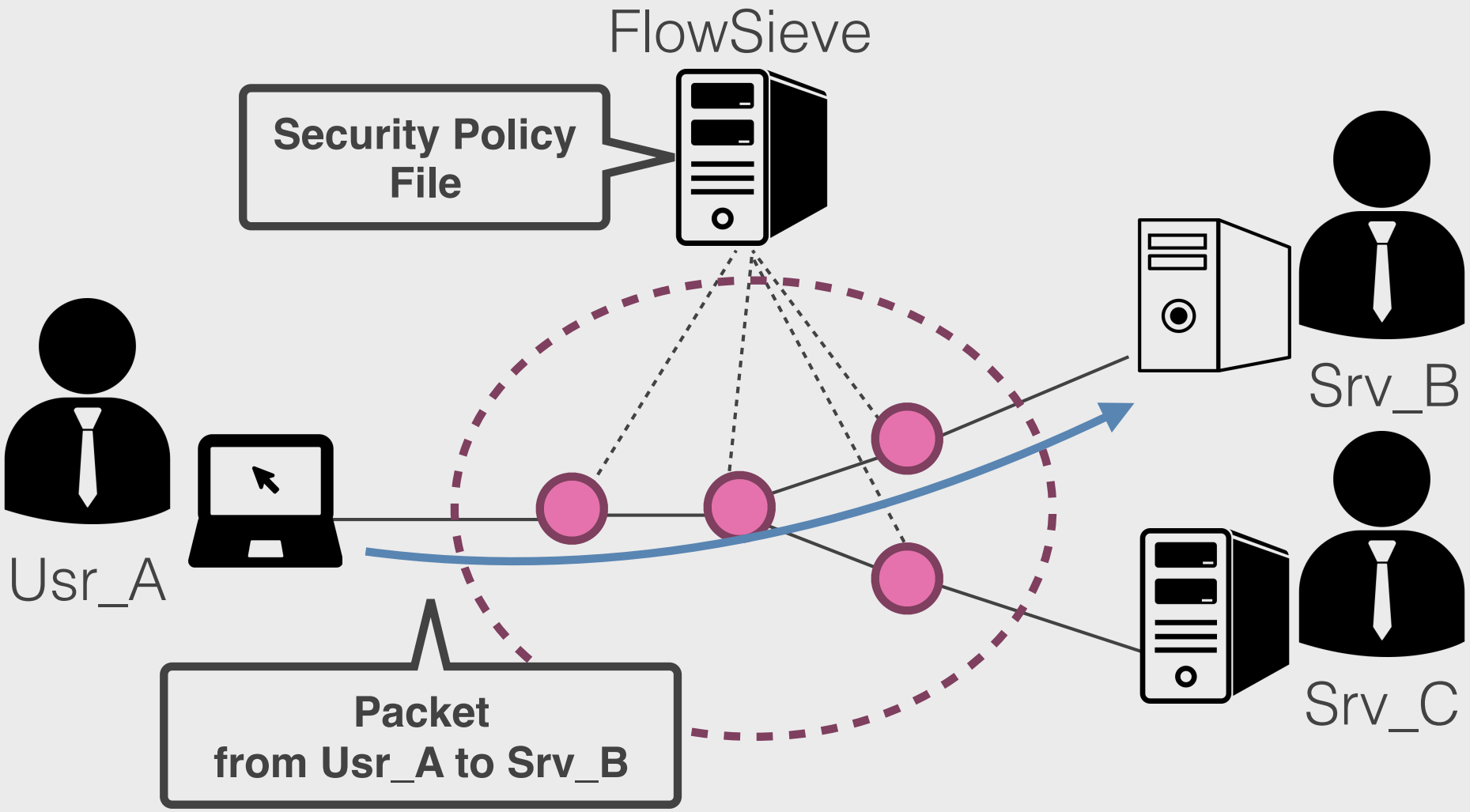


When a user sends a packet,
FlowSieve judge this access is allowed or not.

FlowSieve in Action



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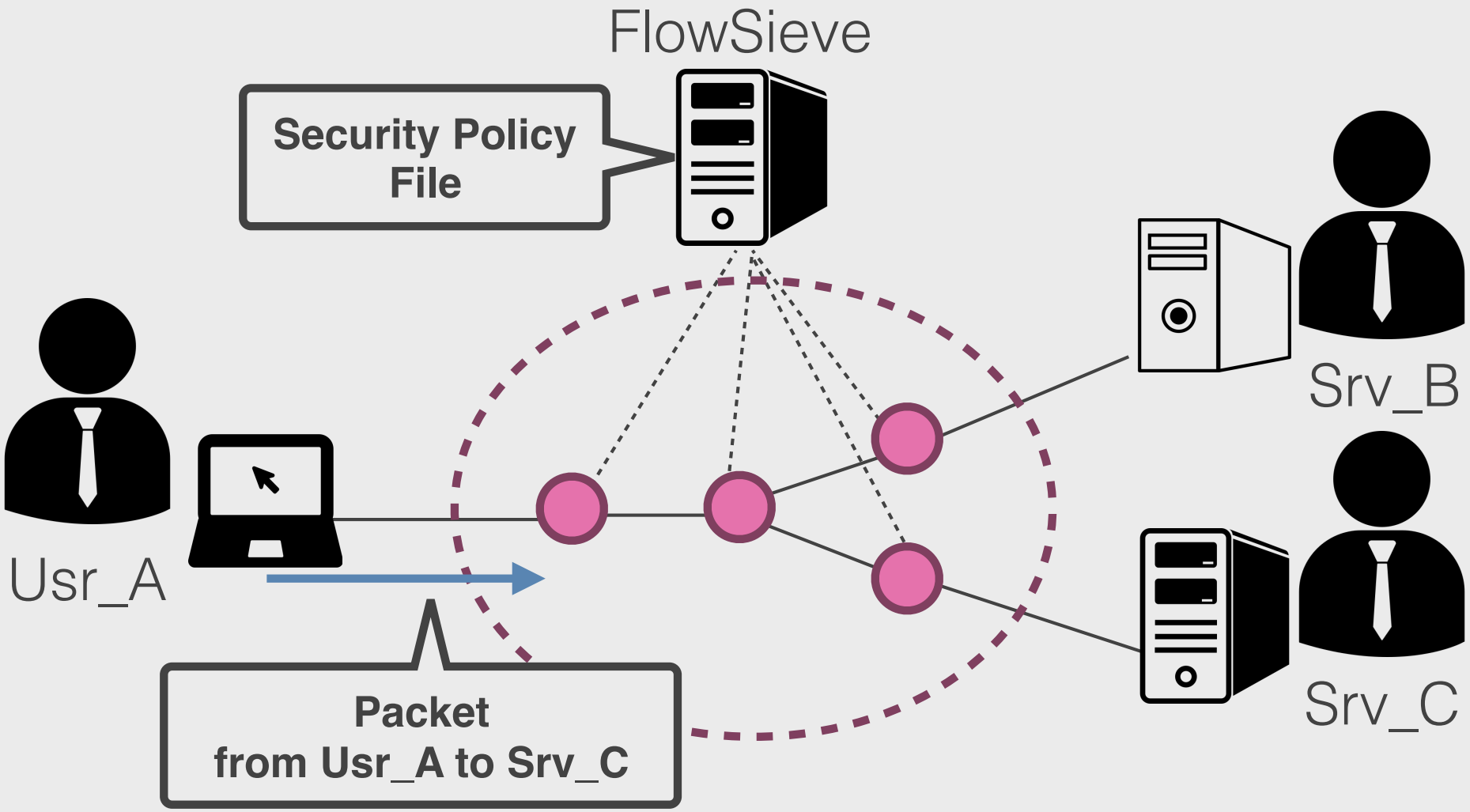
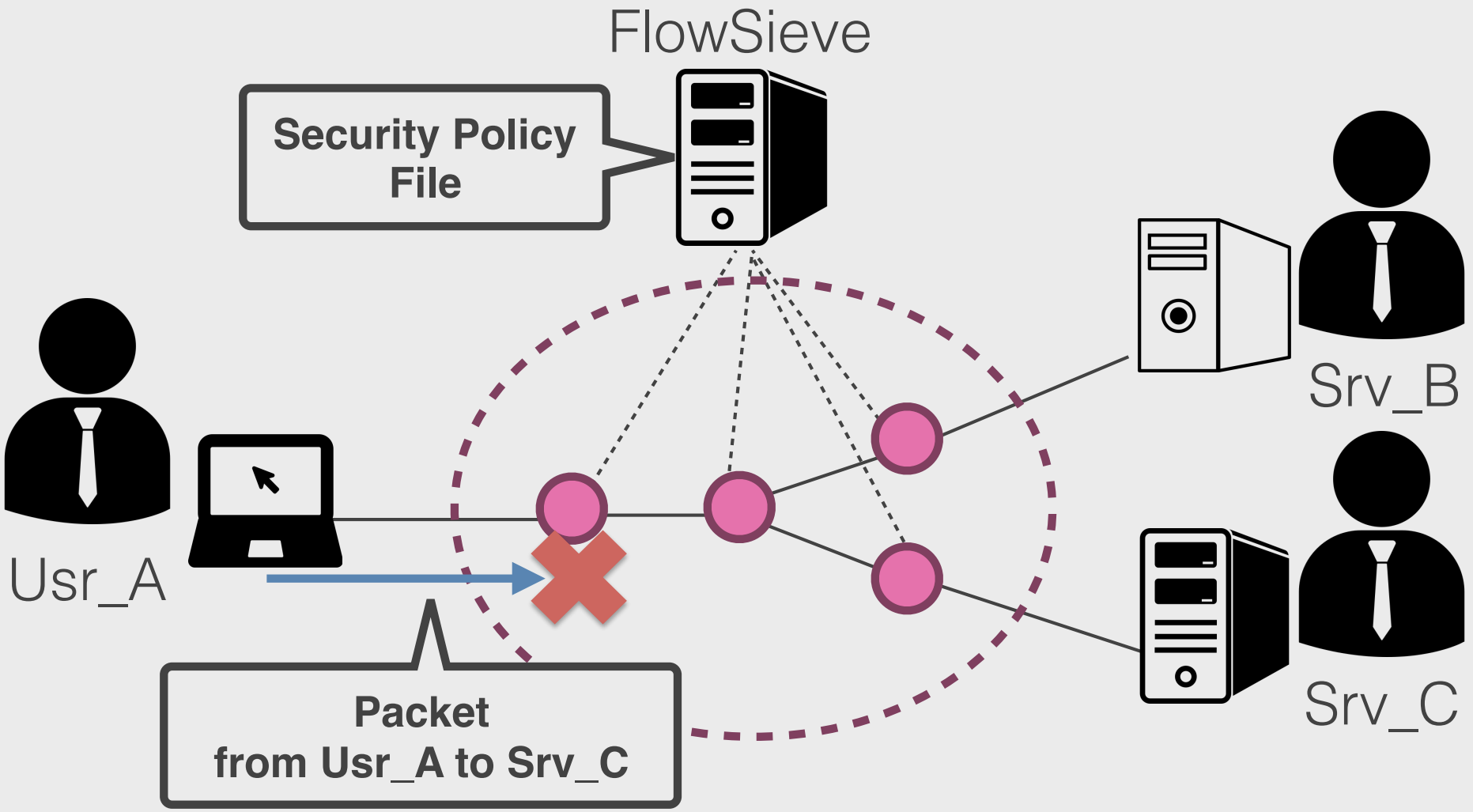


If FlowSieve denies that access,
the packet is dropped in an OpenFlow switch.

FlowSieve in Action



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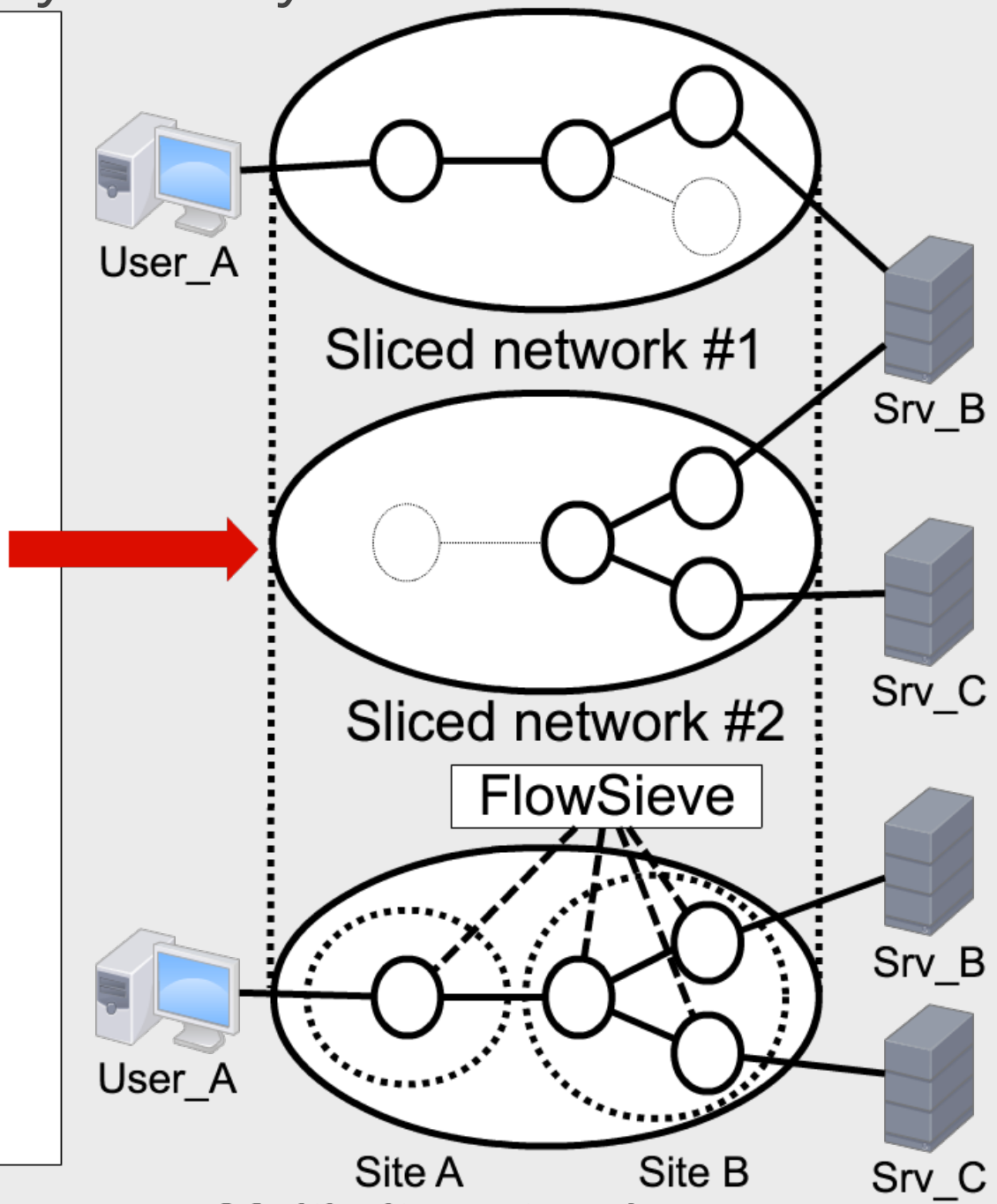
Sample of Security Policy & Sliced Network

```
roles:
      - name: A
        allowed_roles:
          - B
      - name: B
        allowed_roles:
          - A
          - C
      - name: C
        allowed_roles:
          - B
users:
      - name: User_A
        role: A
      - name: Srv_B
        role: B
      - name: Srv_C
        role: C
```

Security Policy File



Multi-site network resources