Fault Tolerant Authentication in Mobile Computing
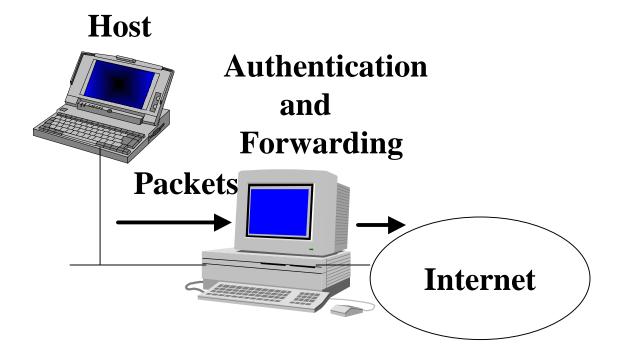
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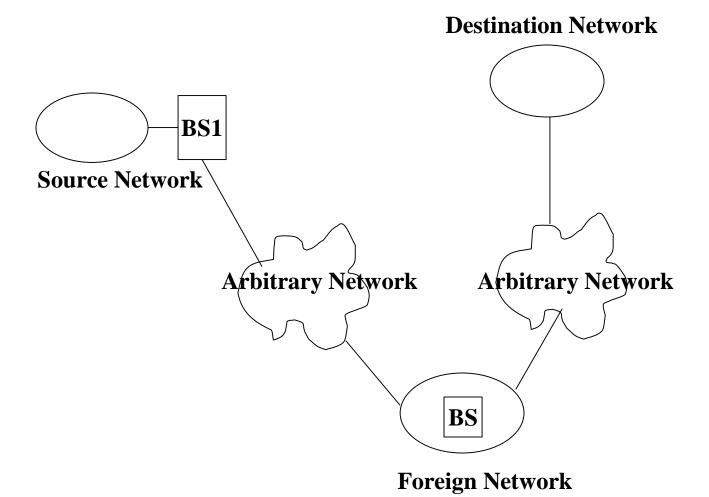
Typical set up

Host

**Authentication
and
Forwarding**

Packets

Internet

Disadvantages

- Home Agent becomes a single point of failure

- Home Agent becomes an attractive spot for attackers

- Not scalable – large number of hosts overload the Home Agent

Proxy-based solution

Destination Network

BS1

Source Network

Arbitrary Network

Arbitrary Network

BS

Foreign Network

Disadvantages

- Introduces additional security threats
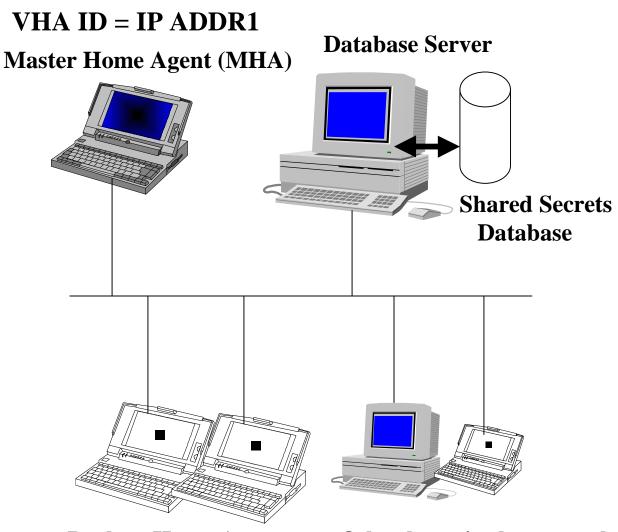
- Additional communication delays

- Not transparent to applications

- Manual set up -- error prone

Research Goals

- Eliminate single point of failure

- Enhance scalability

- Failures -- transparent for applications
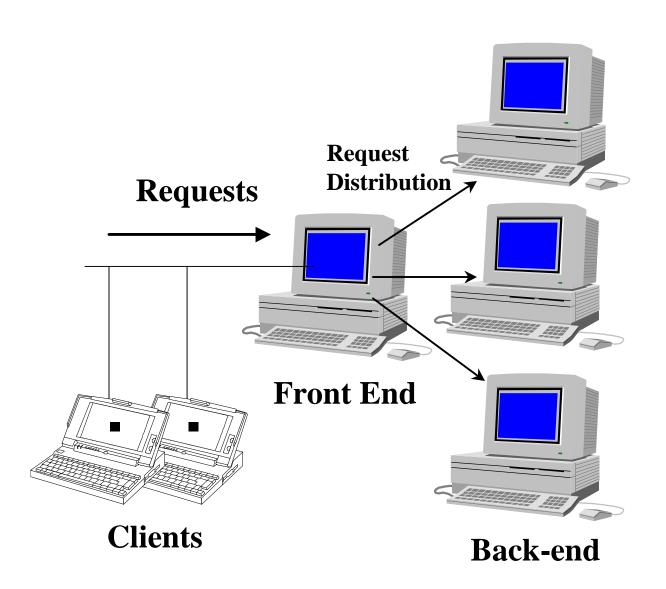
- No manual setup

Virtual Host Scheme

VHA ID = IP ADDR1

Master Home Agent (MHA)

Database Server

Shared Secrets Database

Backup Home Agents
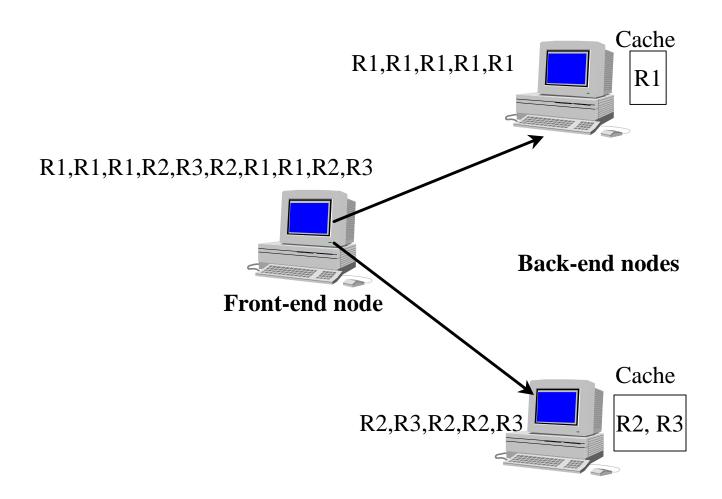
Other hosts in the network

Virtual Host Scheme

- Virtual Home Agent(VHA) is an abstract entity

- Master Home Agent(MHA) is the physical entity that carries out the responsibilities of the VHA

- Backup Home Agent(BHA) backs-up a VHA. When MHA fails, BHA having the highest priority becomes MHA
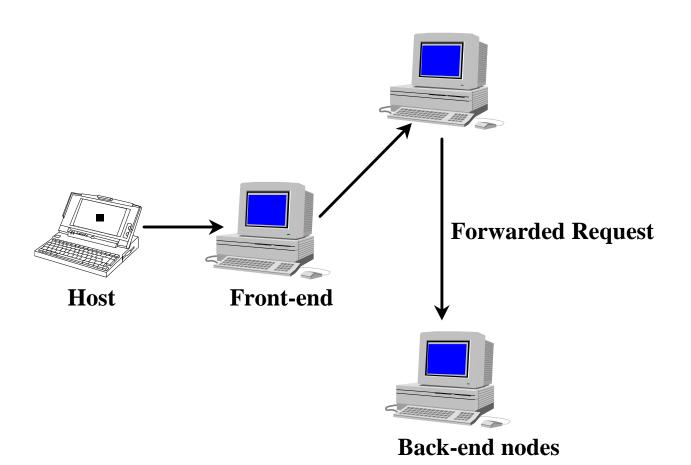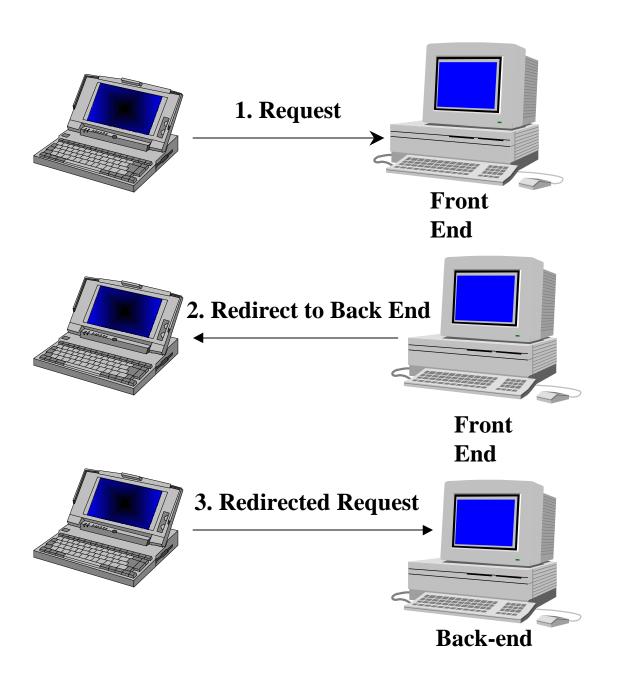
Cluster for scalability

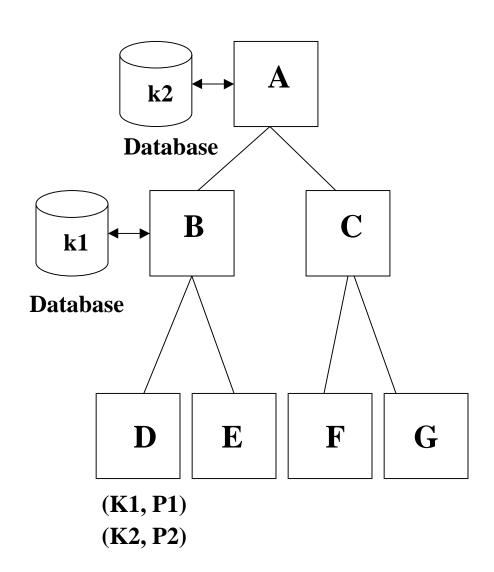**Requests**

Request Distribution

Front End

Clients

Back-end

Locality-Aware Request Distribution

R1,R1,R1,R1,R1

Cache

R1

R1,R1,R1,R2,R3,R2,R1,R1,R2,R3

Back-end nodes

Front-end node

Cache

R2, R3

R2,R3,R2,R2,R3

Back-end Forwarding

Forwarded Request

Host   **Front-end**

Back-end nodes

Request Redirection

1. Request

**Front
End**

2. Redirect to Back End

**Front
End**

3. Redirected Request

Back-end
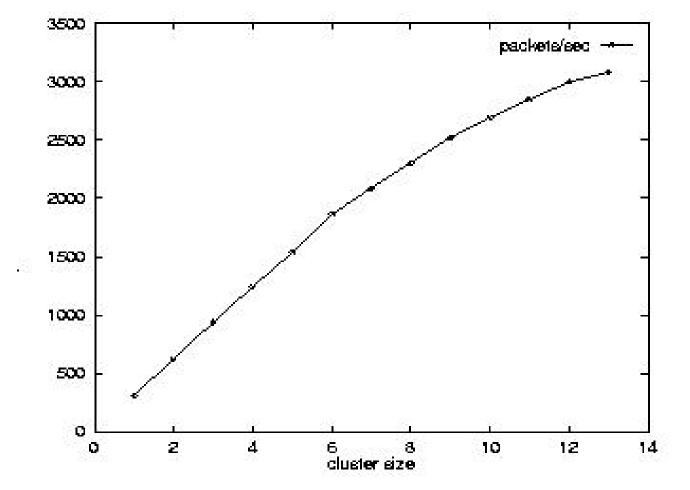
Hierarchical Authentication Scheme

Cluster Throughput (RR distribution)

Hierarchical Authentication Scheme

- Multiple Home Agents in a LAN are organized in a hierarchy

- A Mobile Host shares a key with each of the Agents above it in the tree (Multiple Keys)

- At any time, highest priority key is used for sending packets or obtaining any other service

Hierarchical Authentication Scheme

Key Priority is computed
as cumulative sum of weighted
priorities of factor like

- Communication Delays
- Processing Speed of the Agents
- Key Usage
- Life Time of the Key