TU WIEN

Domain based Security for Mobile Agents

Institut für Computertechnik

ICT

Institute of Computer Technology

Micheal Sonntag

Friedrich Kupzog

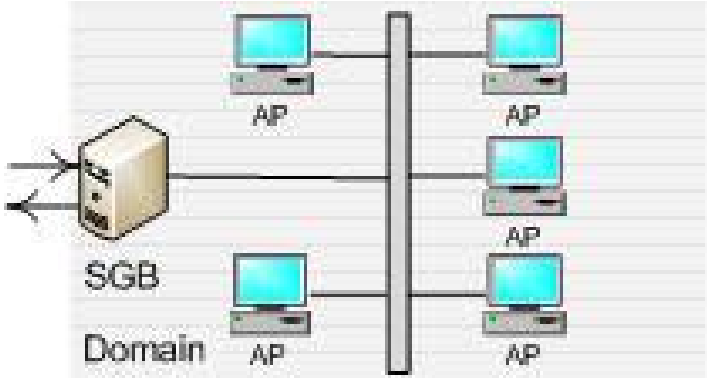
Najmus Saqib Malik

Presentation Layout

- Background
- Domain based security
  - Vulnerability Level (VL) and Reputation Value (RV)
  - Algorithm for mobile agent security
  - Process of changing VL
  - RV behaviour and restriction state
- Simulation
- Results
- Conclusion

Background

- Mobile Agent – MA
- Agent platform – AP
- Security Manager – SM
- Security Services
- Domain



Domain based security

- Vulnerability level – VL
  - Represents the value for domain
  - Higher value suggest bad
  - Lower value is good
- Reputation Value – RV
  - Degree of honesty for a platform
  - Larger RV => platform is safe to visit
- VL and RV are maintained by the security manager

Domain based security

Algorithm for mobile agent

1) start execution of task and collect the results
2) calculate the hash code itself without results
3) compare this hashcode with one caluculate in previous AP
4) if not same discard new results and move to SM else continue
5) send the hash code to SGB
6) if VL is H send results to SM
7) if VL is M and CP % (n/m) = 0, send results to SM
8) if VL is L then continue

Contd.

9) fetch RV of next AP from SM
10) if RV is acceptable
    1) CP ++
    2) If RV of next AP is smaller then current AP then sends all the results to SM
11) else continue with step 9

Domain based security

Process for changing VL

- if 20% of mobile agents are modified, de-grade VL level
- if (a <= 5% b) then up-grade VL level

  where a = No. of times the AP(s) are found malicious

  b = No. of times the AP(s) are found honest

Domain based security

RV behaviour and Restriction State

- RV is calculated every time when MA found malicious, as

$$RV = 1 - \sum_{i=1}^{Y}(i) / \sum_{j=1}^{X}(j)$$

where X = No. of MAs visit an AP

Y = No. of MAs that are modified by same AP

- if any platform modified certain percentage of visitng mobile agents then it is in *restriction state*
- no MA will visit AP until it comes out from restriction state

Domain based security

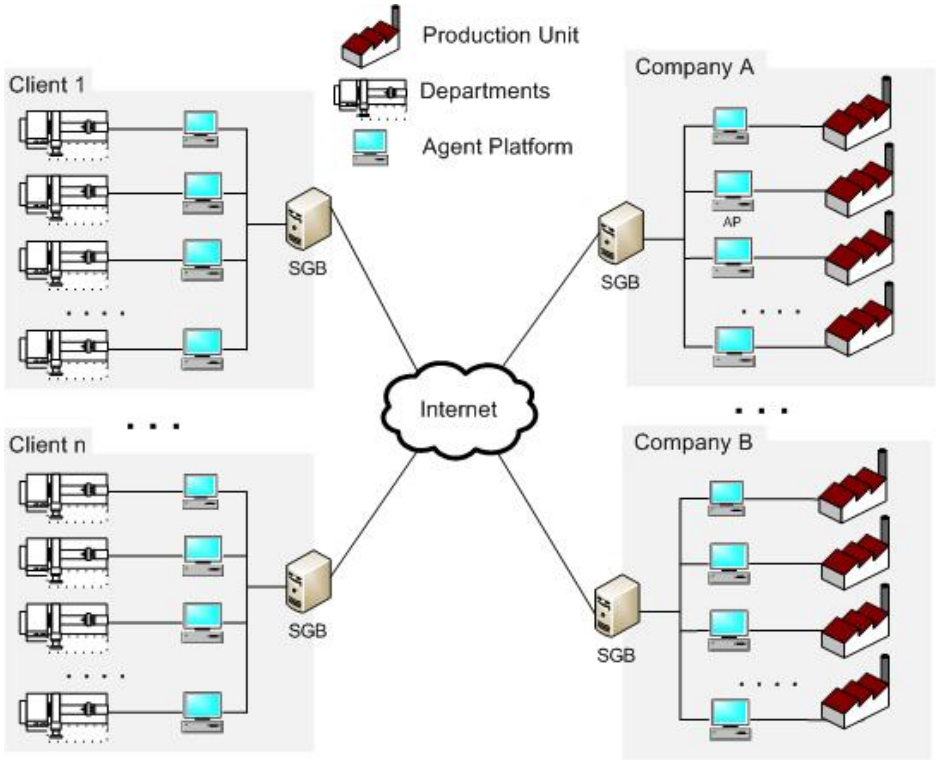
when AP is in Restiction State then

- SM send dummy MA to AP
- if dummy MA is modified on return
  - Recalculate RV value
  - if RV < 0.4 then terminate the AP
- else if No. of dummy MA is equal to Y
  - incerement X
  - recalculate RV

when RV > 0.6, AP‘s Restiction State is over

Scenario from Production Area

A MA from a company visit its different client‘s site to collect orders.



Simulation

- OMNetpp is used for simulation
- Initially
  - Domain‘s VL = 1 (low) and each AP has RV = 1 (high)
  - The RV and VL assigned to MA is shown below

MA	RV	VL
50%	1.00	1.00
30%	0.95	2.00
20%	0.90	

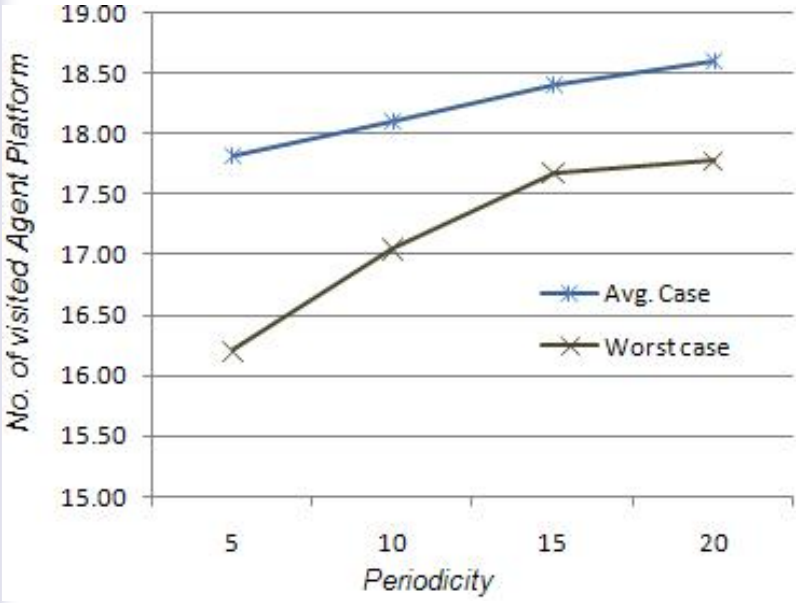
- Two cases:
  - Average case : half of the AP modify the mobile agent with differnet periodicity
  - Worst case : more the half of the AP modify MA with different periodicity
- Periodicity

  The size of a set of agents in which one agent is changed by AP

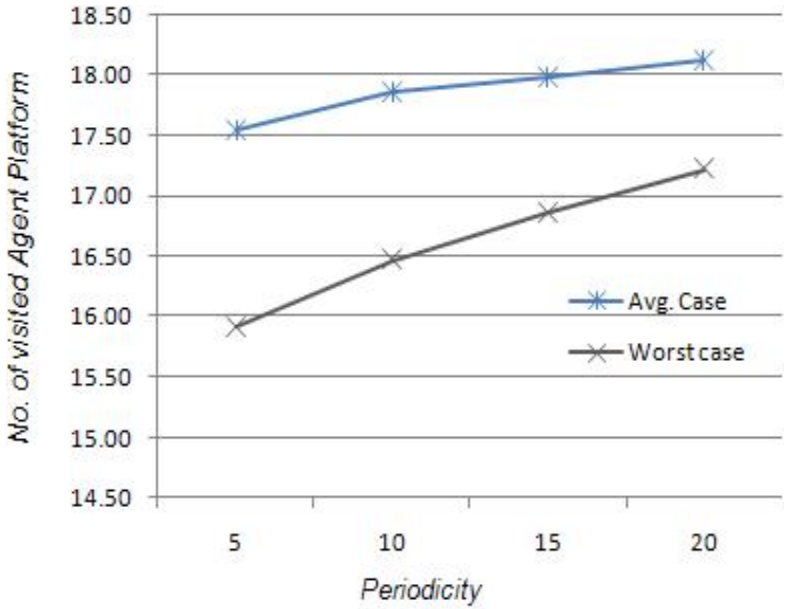
Results

Two cases:

- Average case
- Worst case



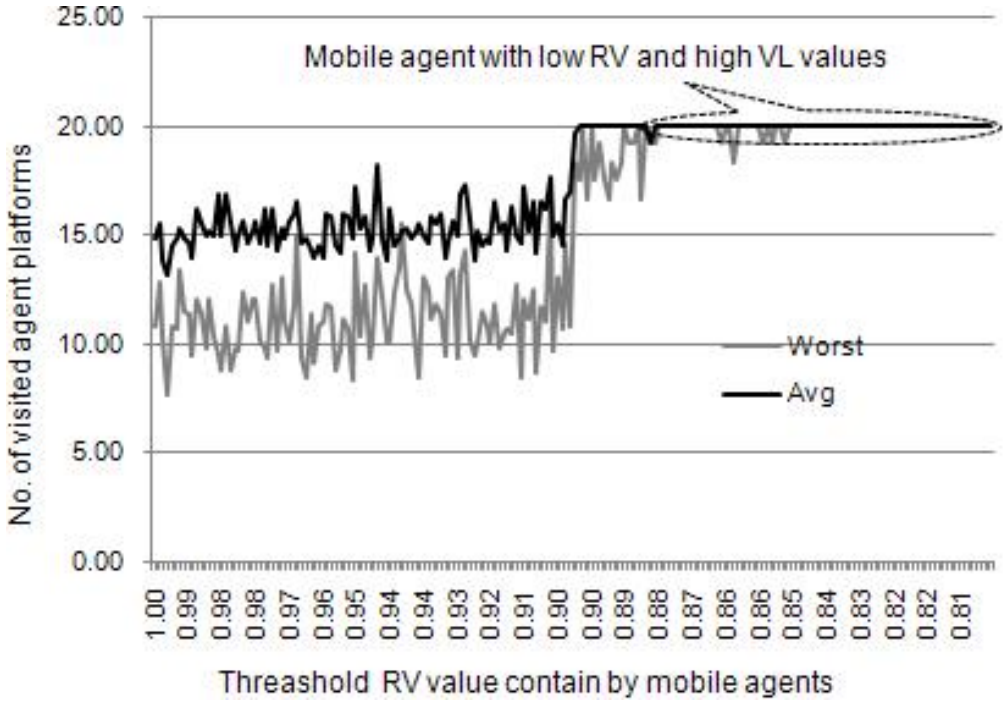
100 MAs



200 MAs

- Periodicity

the size of a set of agents in which one agent is changed by AP



Conclusion

- MA can decide whether to visit a domain or not
- This cumulative decision save the turnaround time for mobile agent
- A global agreement upon the rules for RV and VL is required in a form of standard