Addressing Security Issues in Programming Languages for Mobile Code

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Introduction

- Mobile Code
  - travels on heterogeneous networks
  - crosses security domains
  - is executed upon arrival to the destination
  - *security concerns*

Mobile Code Languages

- Java

general-purpose, object oriented language. Portable in compiled binary code

- Safe-Tcl

high-level interpreted scripting language

- ActiveX

visual control framework, using COM as the underlying infrastructure. O/S dependent

Security Issues

Hostile Applets

- attack the *Integrity* of a system

- violate the user's *Privacy*

- limit the *Availability* of a system

- achieve user's *Annoyance*

Java Security

- *Sandbox*
  - Classloader
  - Bytecode Verifier
  - Security Manager

- JDK 1.2 new security modus operandi
  - security policy
  - access control
  - protection domains

Java Security - Extensions

- Digital Signatures

- Policy Enforcement
  - capabilities
  - extended stack introspection
  - namespace management

- Policy Definition

- Secure Code Distribution

- Corporate-wide policy

- Confining the use of Java in a network domain

Safe-Tcl Security

- Padded cell approach / Dual-Interpreter
  - Trusted Interpreter -> Full Tcl
  - Untrusted/Restricted Interpreter -> Safe-Tcl
- Command Aliases
- Security Policy

Safe-Tcl Security Extensions

- Authentication of Tclets

- Authentication of Safe-Tcl security policies

- Confronting with denial-of-service attacks

ActiveX Security

- Applet authentication

- code *safe for initialising*

- code *safe for scripting*

- lack of configurable security policy

- ActiveX, Digital Signatures and Firewalls

ActiveX Security - Extensions

- Execution safety

- Software memory protection
    - attach proofs of *memory protection* to code

Conclusions

- Security Scheme

- Detailed Security Policy

- Security Integration