Distributed Policy Management for Java 2

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Overview

- Introduction
- Java 2 security model
- Authorization certificates, SPKI
- Using SPKI certificates to improve Java 2 security policy management
- Implementation
- Conclusions

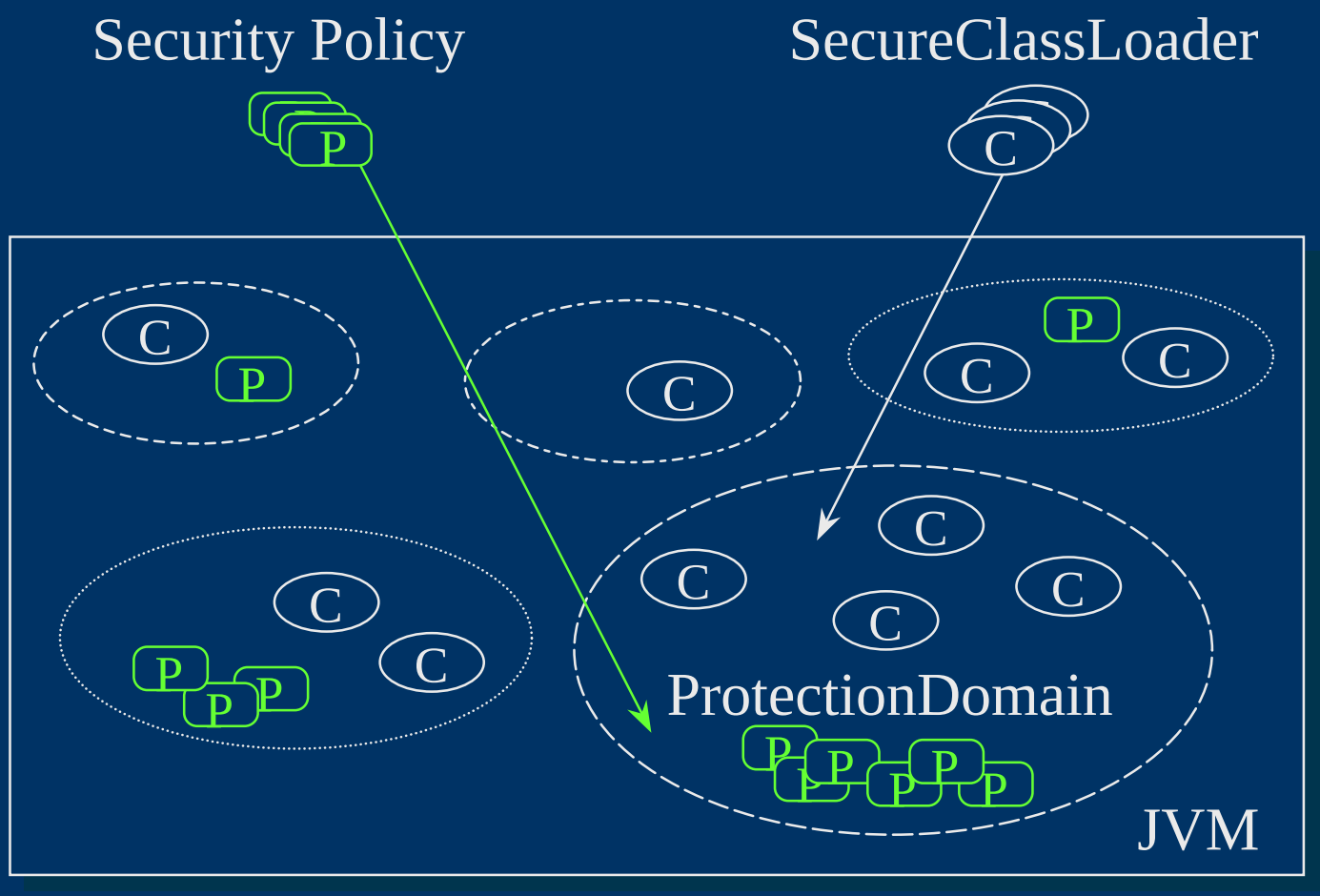
Introduction

- We are considering a very large, distributed Java environment
  - Computers
  - Cellular phones
  - PDAs
- The users want to run software from many different sources without compromising security

The Problem

- How to **manage** the security policy?
  - In a scalable way?
  - With minimum dependency of external security mechanisms?
  - In a way transparent to the applications?

ProtectionDomains



Java 2 Access Control

- When the class tries to access a protected resource, the AccessController checks the permissions in the class' protection domain
  - The class cannot add permissions to its protection domain
  - The class cannot change its protection domain

The Current Solution has Limitations

- Access rights are defined in local configuration files
  - Changing the policy requires editing the files
  - The files can get very complex
- Access rights are practically static
- How can the administrator know what access rights a certain class needs?

Authorization Certificates

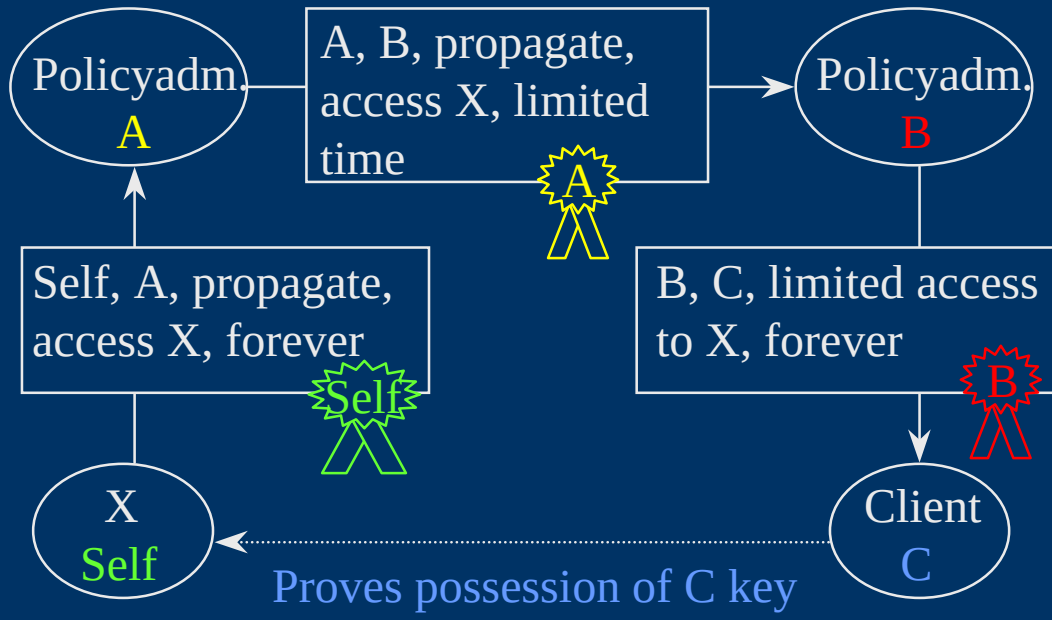
- Identity certificates bind a name to a key
  - Usually ACLs are then used to define what the name is allowed to do
- Authorization certificates bind access rights directly to a key
  - Close to the concept of capability
  - Can provide anonymity

SPKI Certificates

- Simple Public Key Infrastructure
- Being published as Experimental RFC
- SPKI certificates are signed five-tuples
  - Issuer
  - Subject
  - Delegation
  - Tag (i.e. authorization)
  - Validity

Certificate Loops

- When authorization is delegated, the certificates form chains
- When used, the chain is closed into a loop:



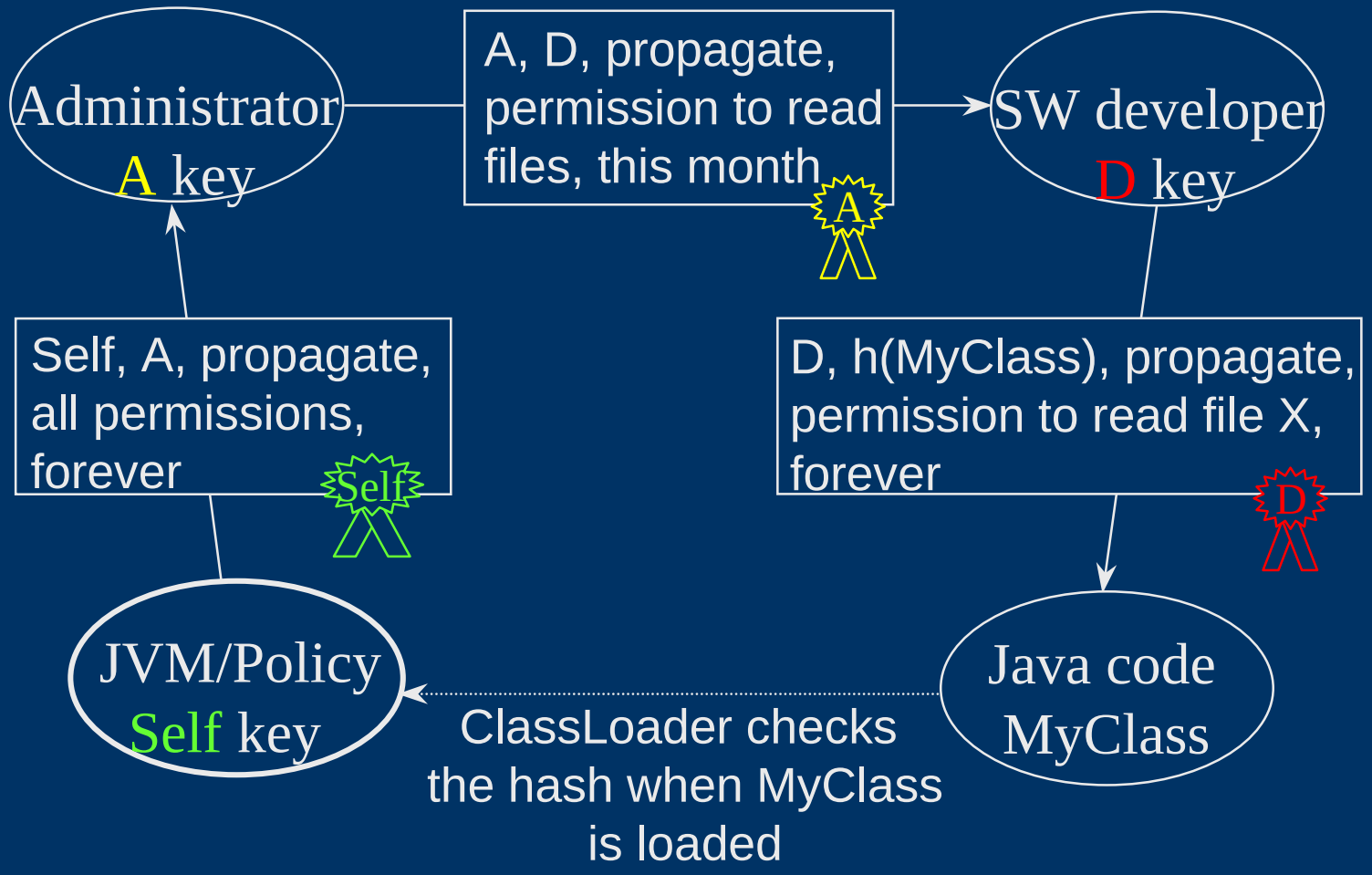
SPKI Certificates for Java

- Issuer, subject, delegation, validity etc. expressed according to the SPKI specs
- Tag definition is more focused: tags express Java permission objects

  (tag (java-permission
  (type *java.io.FilePermission*)
  (target */tmp/myfile*) (action *read*)))

  – Tags may also express a set or “any” permissions

Authorizing Java Classes



Prototype

- Public interfaces for SPKI certificates
- A Provider that implements the SPKI certificate functionality
- A Policy that uses dynamic protection domains and SPKI certificates to grant permissions
- A simple certificate repository
  - Is being replaced with DNS

Distributed ProtectionDomains

- If the protection domains could have temporary keys, they could delegate their permissions to other domains
  - The JVM must provide the keys
  - The JVM must help bind the temporary key to the object
- For example, a client could authorize an agent on a server to perform tasks on its behalf

Conclusions

- SPKI certificates can be used to make Java security policy management
  - Secure
  - Distributed
  - Scalable
  - Dynamic