Open Java-Based Intelligent Agent Architecture for Adaptive Networking Devices

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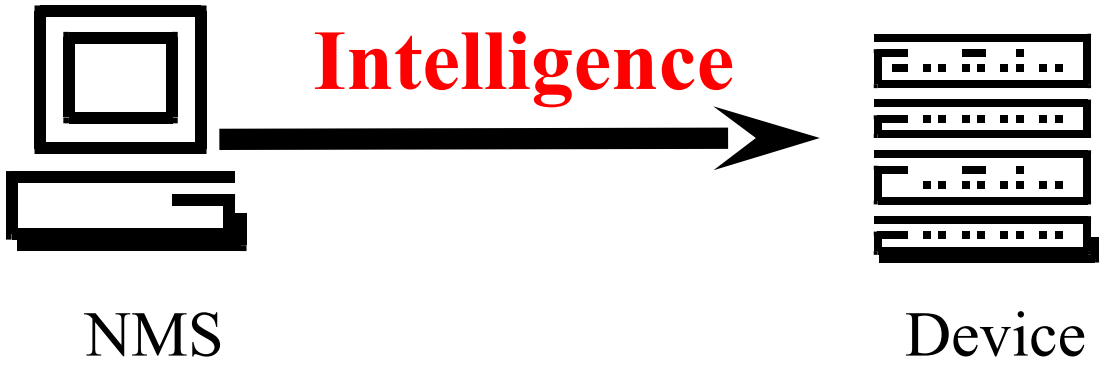
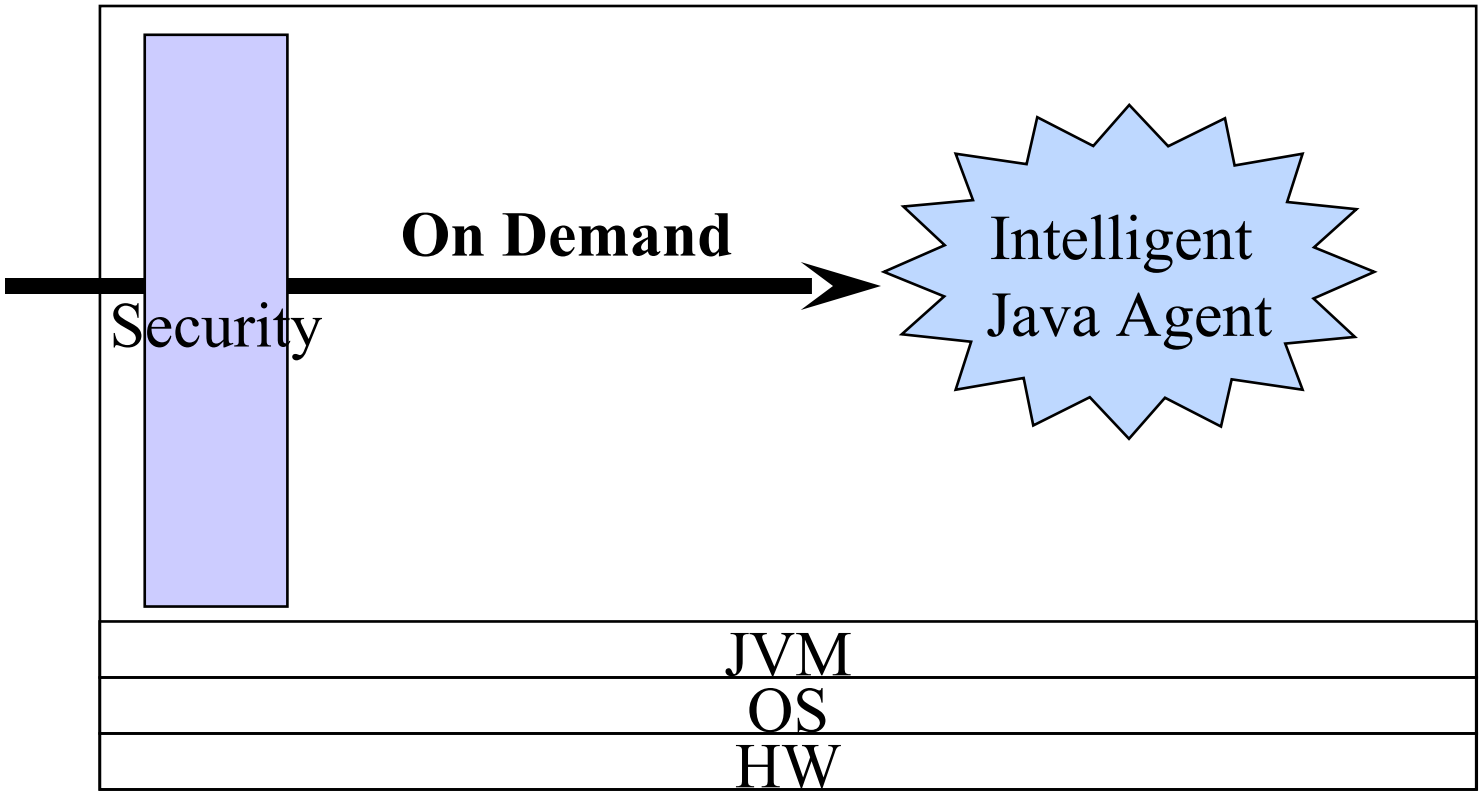
Intelligent Agents



Intelligent Agents -
Distribute the intelligence from NMS to the devices

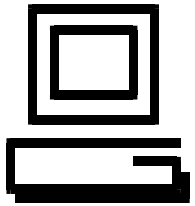
Secured Download of Intelligent Agent-on-Demand



Technology Concept Proposal
"Reversed Applets"

Web Server

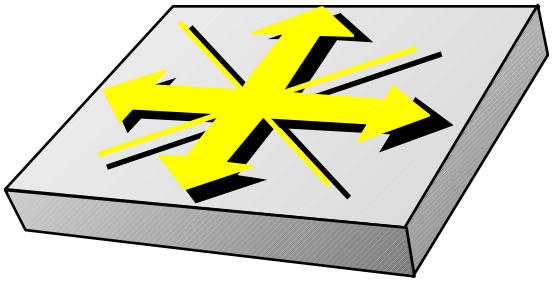
Applet



Web Browser

The JVM is in the Browser

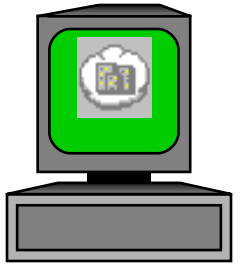
Proposed technology is based on the concept of Reversed-Applets



The JVM is in the Device

Java Beans

Reversed Applets

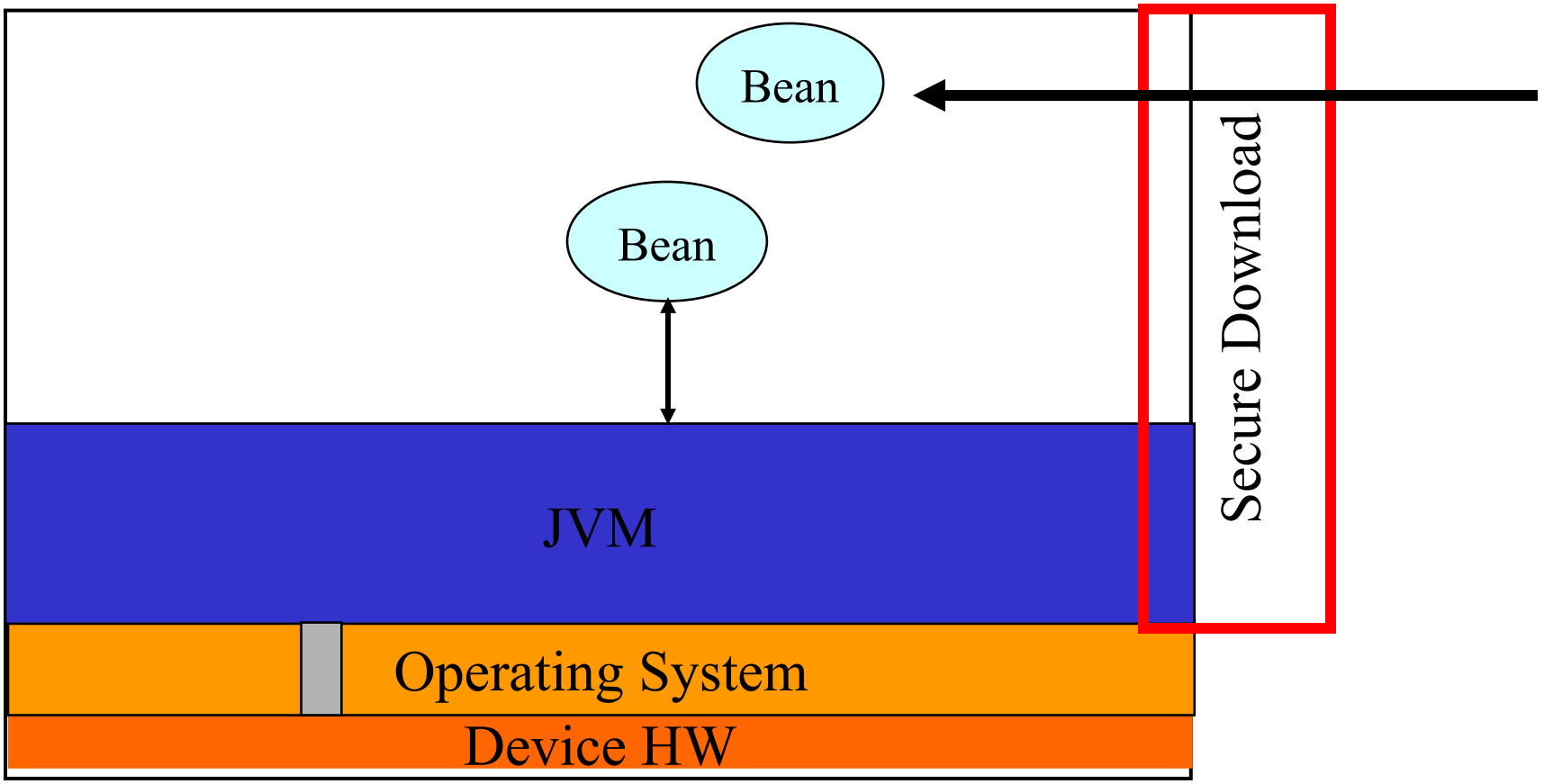


NMS

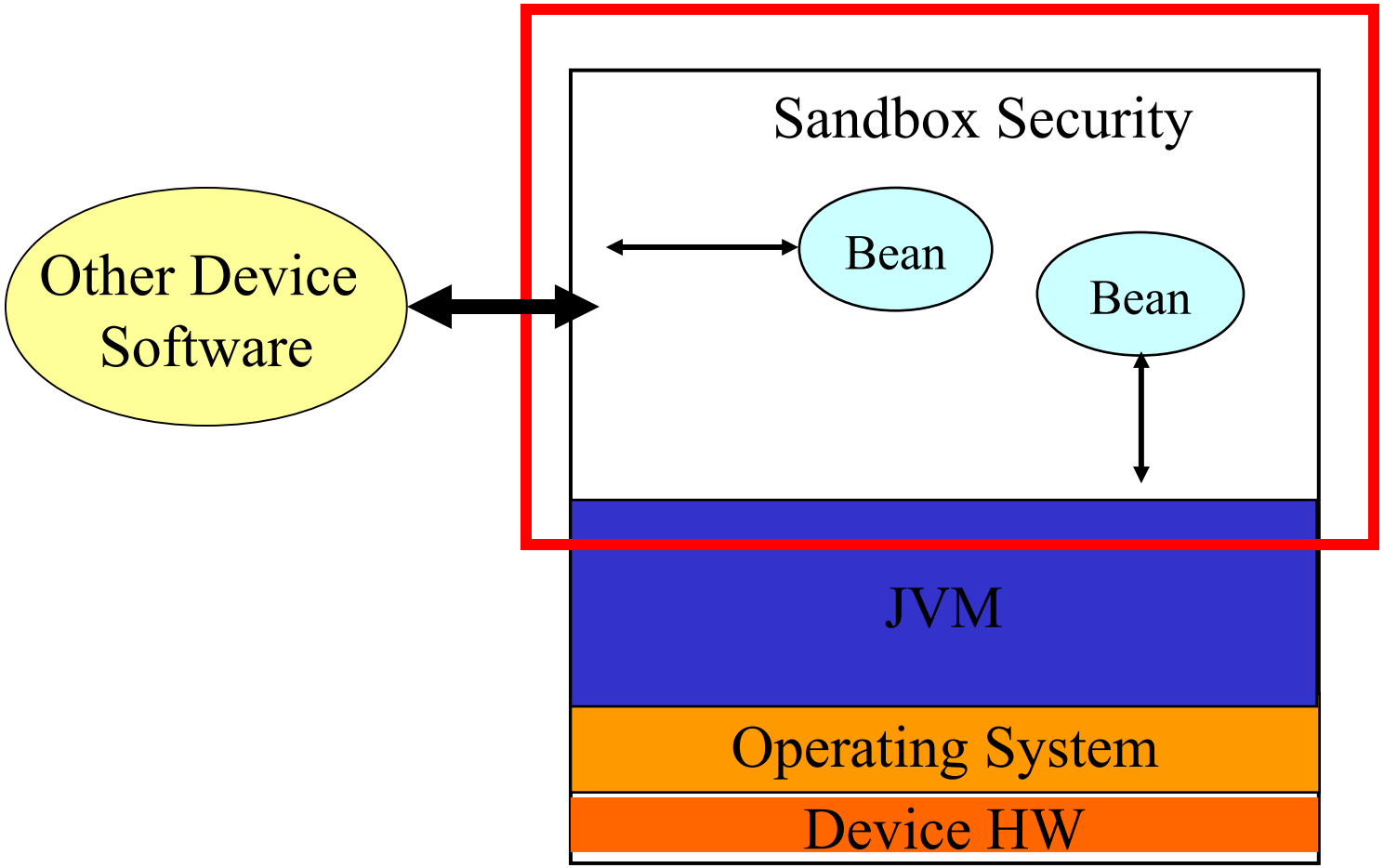
Secure new model

- The new concept is to add new capabilities to devices securely
  - No access out of the JVM space
  - No pointers to harm the work
  - Access only to the published API
  - Verifier - only correct code can be loaded
  - Class loader access list
    - Different Applets with different access levels
  - JVM has run time bounds, type, and executing checking

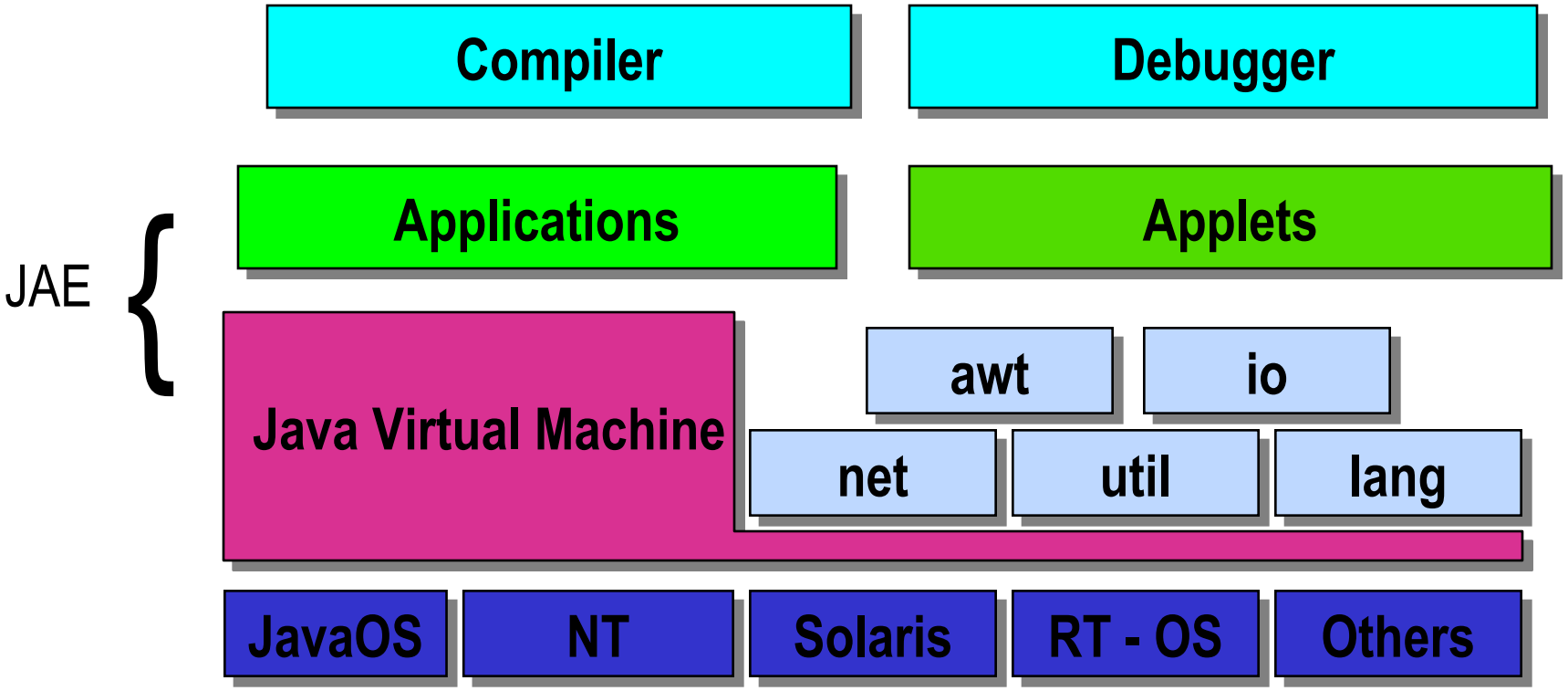
Secure Download



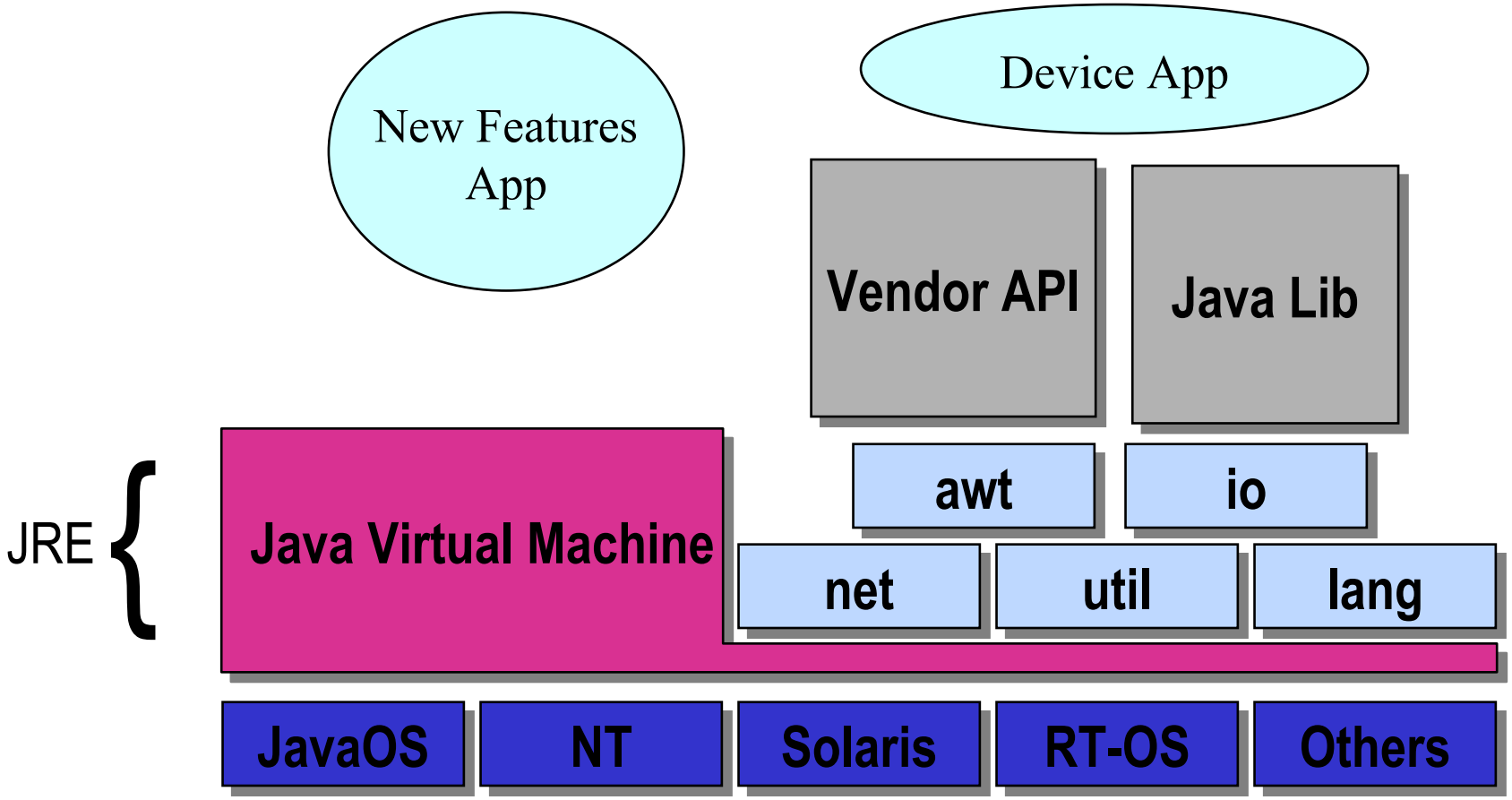
Sandbox Security
No access out of the Boundary



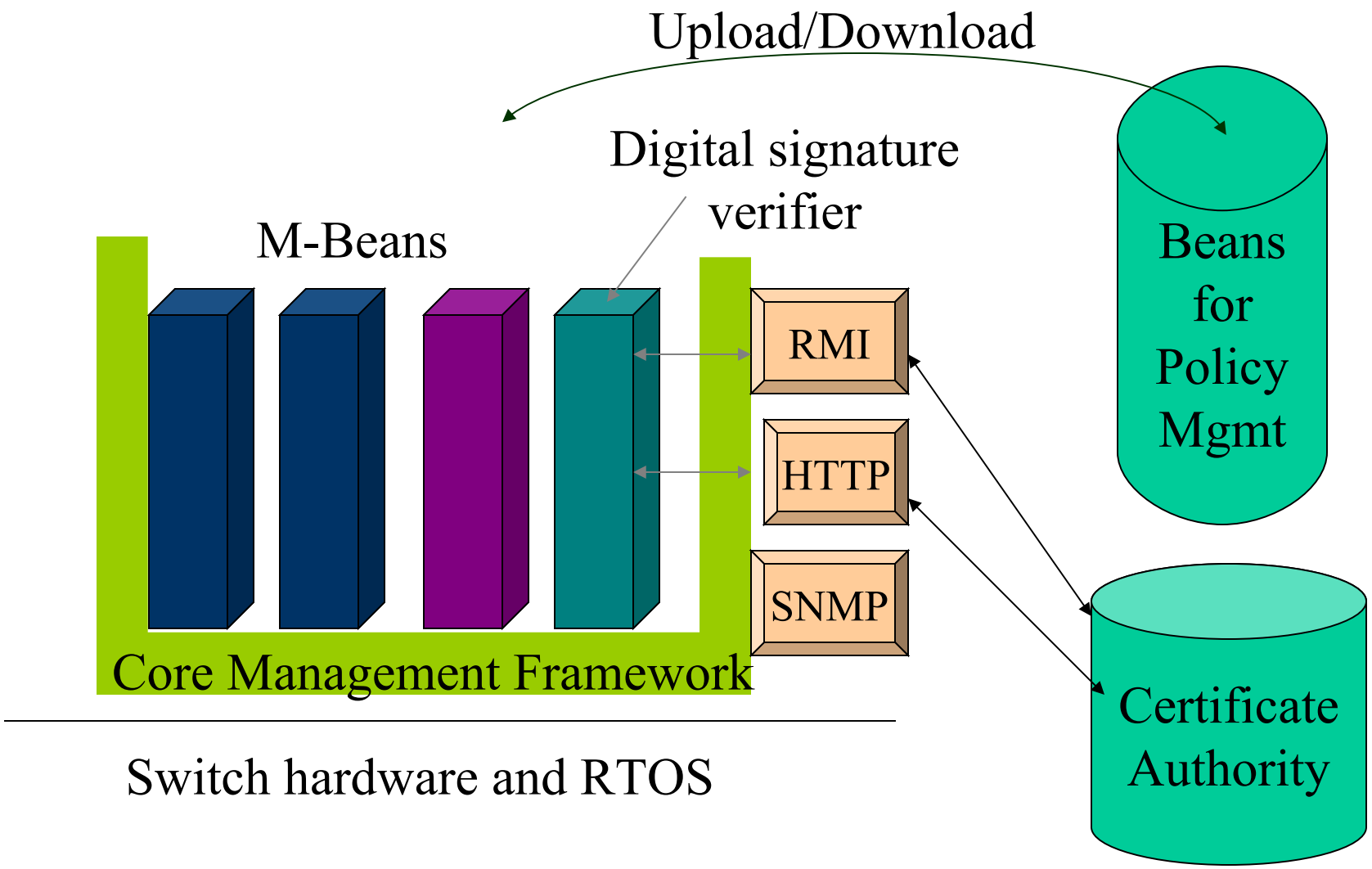
Java Developer Kits



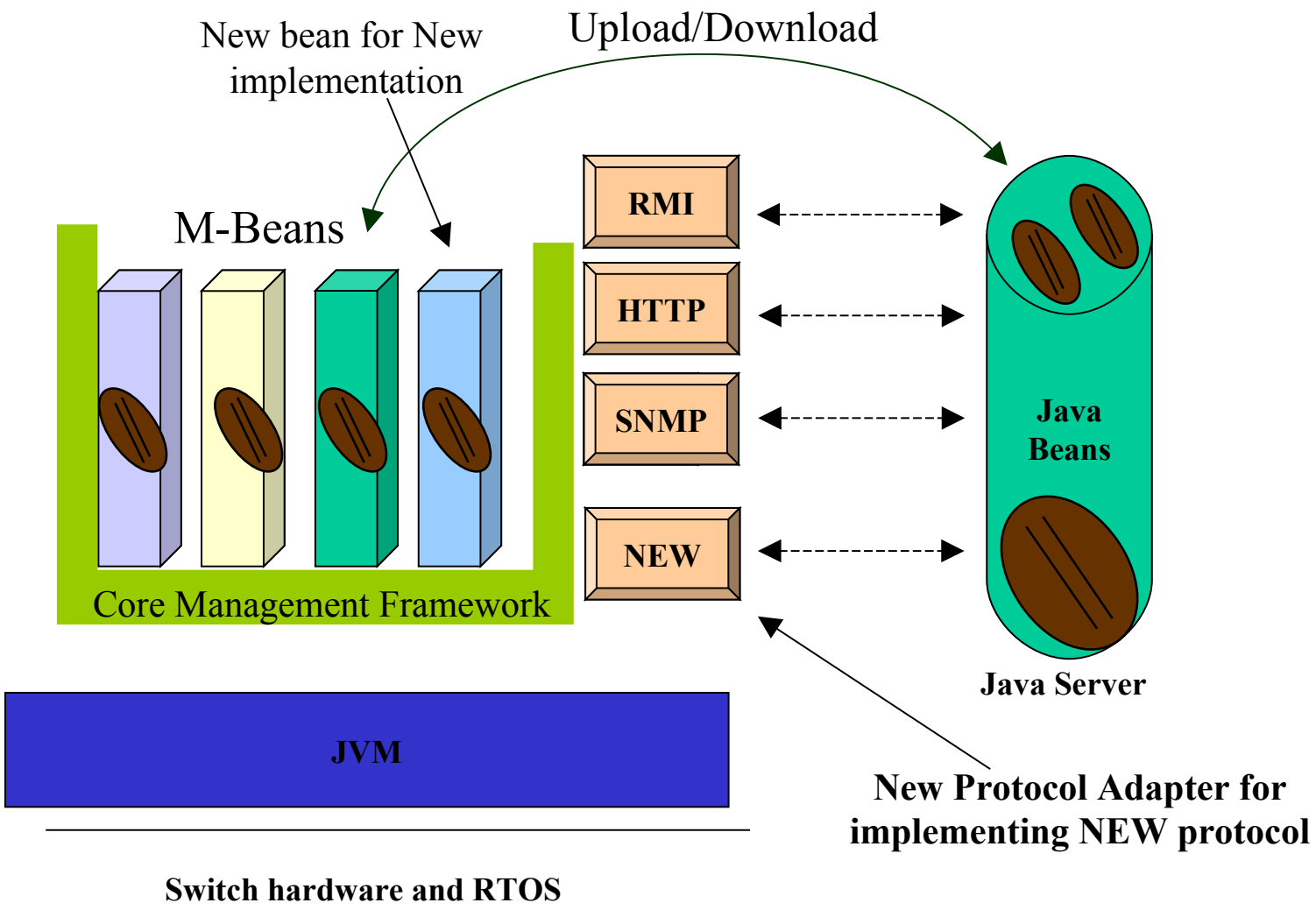
Open Device to New Features



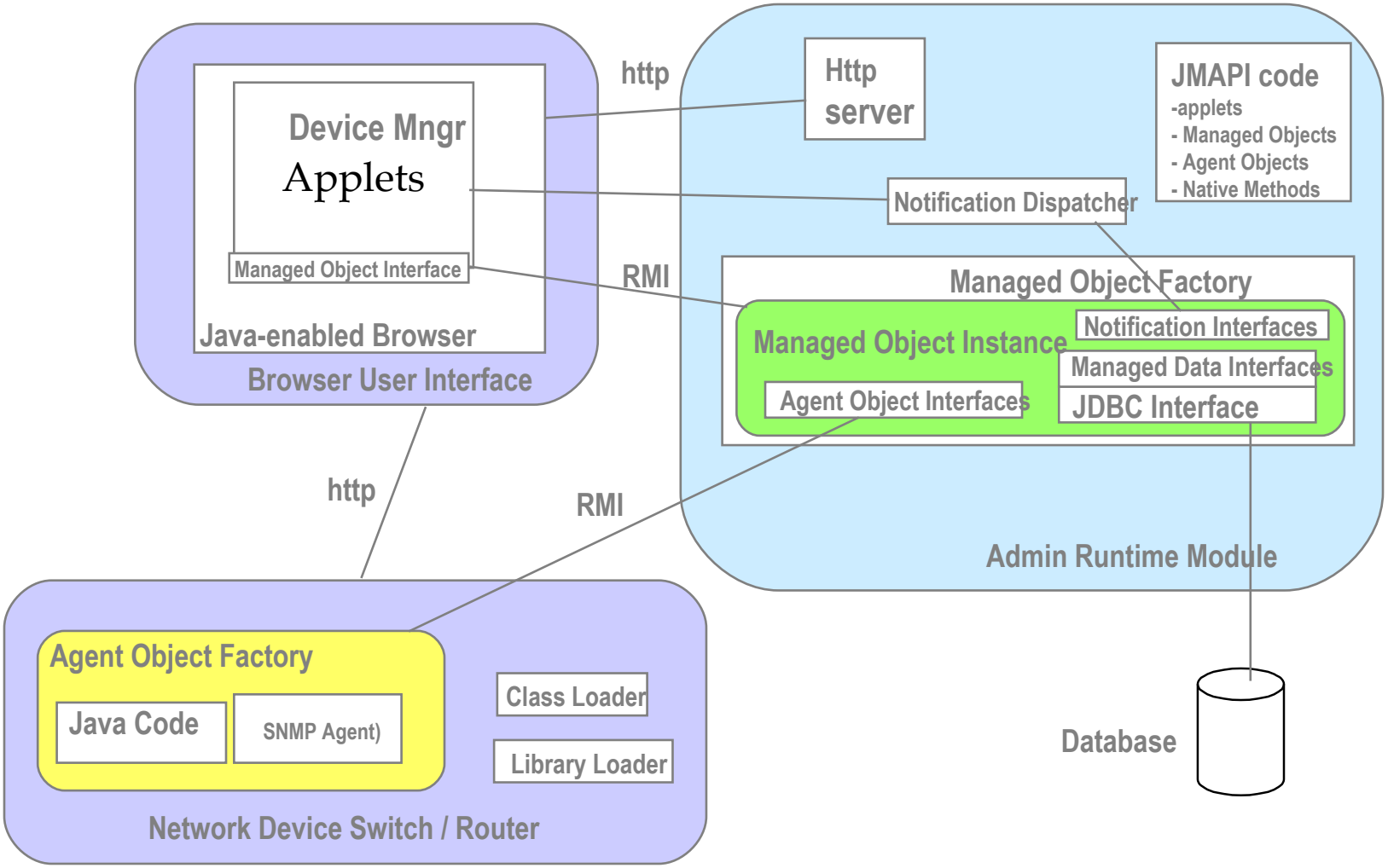
Distributed Bean Implementation



New Protocol Adapter

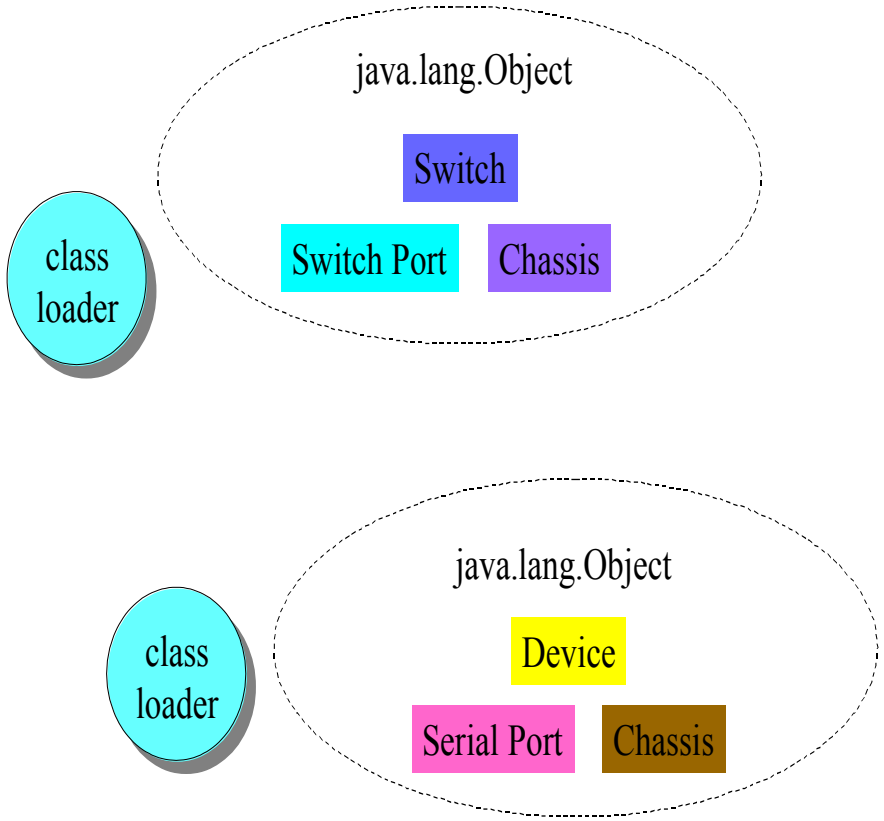


JMAPI Architecture



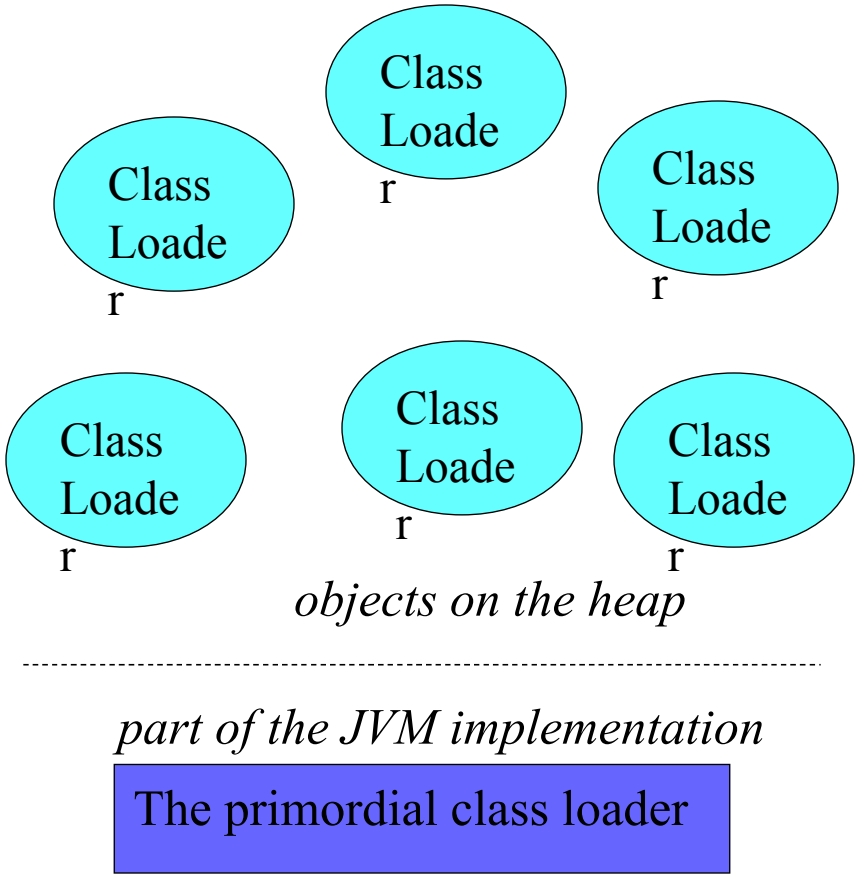
Each class loader in a JVM has its own name space.

- Set of type names already loaded
- Each name unique within name space
- But not unique across name spaces



2 Kinds of Class Loader

- Primordial class loader -- part of VM implementation
- Class loader objects -- part of Java application



Java Performance

- Java is Slow!!
- The memory requirements are high!
- Java doesn’t fit to the data plane
- Examples of using Java in the control plane
- The performance is ok for Intelligent Agents

Potential Applications

- "Feature Plug-in" for devices.
- Reusable software across devices.
- New class of system level NMS applications in the form of distributed "Optlets".
  - Characterized by system applications that requires intensive interaction between NMS and device and/or across multiple devices.
  - Potential applications are topology, design analysis, diagnostics, policy implementations.

Benefits and Value

- Enabling component of a new intelligent network architecture
  - Distributed applications-on-demand.
  - Component of AI (Artificial Intelligence) enabling infrastructure.
  - Roaming diagnostics and self-healing capabilities.