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Trustworthy Commodity Computation and Communication

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SecureCore

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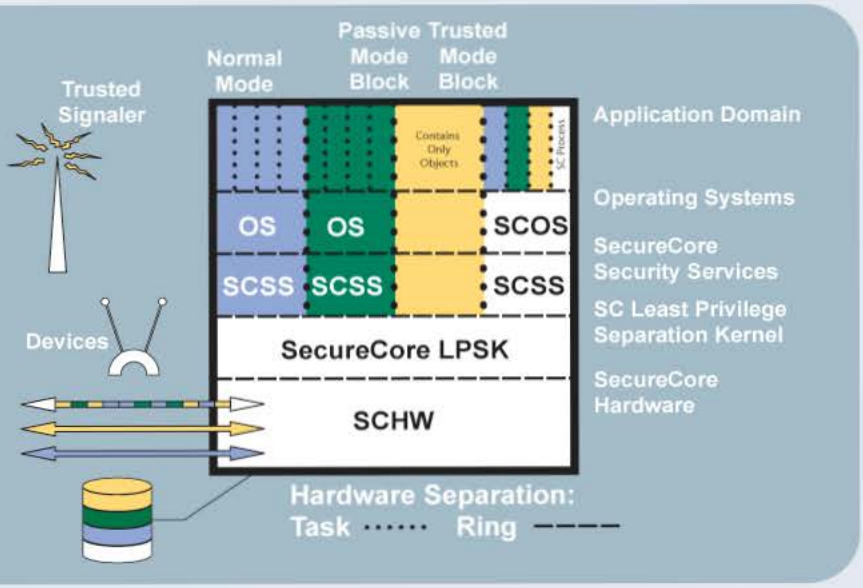
http://cisr.nps.navy.mil/projects/securecore.html

Trustworthy Commodity Computation and Communication

Perform research into design of secure integrated core architectures for trustworthy operation of mobile computing devices.

Including:
Security-aware SecureCore Hardware, SecureCore Least Privilege Separation Kernel, SecureCore Security Services, and secure communications

For use in resource-constrained, ubiquitous computing platforms, i.e. secure embedded systems and mobile computing devices



Comparison to state-of-the-art

Current approach
- ad hoc revocation mechanisms
- temporal policies lack low level support
- VMs provide no sharing
- trusted subjects all or nothing
- isolated design of layers
- security with coprocessor

New Approach to
- revocation
- temporal access control
- read down from VM
- modeling & assured control of trusted subjects
- codesign of HW/Kernel/Services
- unified processor

Technical Summary

Anticipated technical advances
- Kernel-based fine grain control of trusted subjects
  - A trusted subject may only access certain objects in its trust range – minimizes reliance on the correctness of application-domain security services
  - Formal model and architectural solution define "controlled interference" for trusted subjects.
- Subjects can "read down" to blocks at lower levels, as allowed by kernel
  - Also, kernel-controlled controlled write-up ("blind" write)
  - Traditional separation kernel architectures lack these abilities
- Exportation of hardware interrupts to the client OS
  - Enables OS-specific interrupt handling regarding subjects' access violations to individual resources
  - Traditional separation kernel architectures only provide block-level notification
- Kernel-based "intransitive information flow" enforcement
  - Traditionally requires trusted subjects
  - SecureCore supports, for example, a policy whereby each subject may only read down one level, because of data integrity or system assurance concerns.

Innovation
Utilization of hardware/kernel/SCSS co-design to construct SCSS interface such that SecureCore unique security features do not require modifications to the client OS.

Recent Developments
- Hardware and software architecture and authorization model to support temporal access controls
- Hardware and software mechanisms to support object reuse requirements
- Re-examination and synthesis of security principles relative to current technology trends and target platform

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WHERE DISCOVERIES BEGIN

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