Least Privilege Separation Kernel (LPSK)

Accomplishments and Current Work

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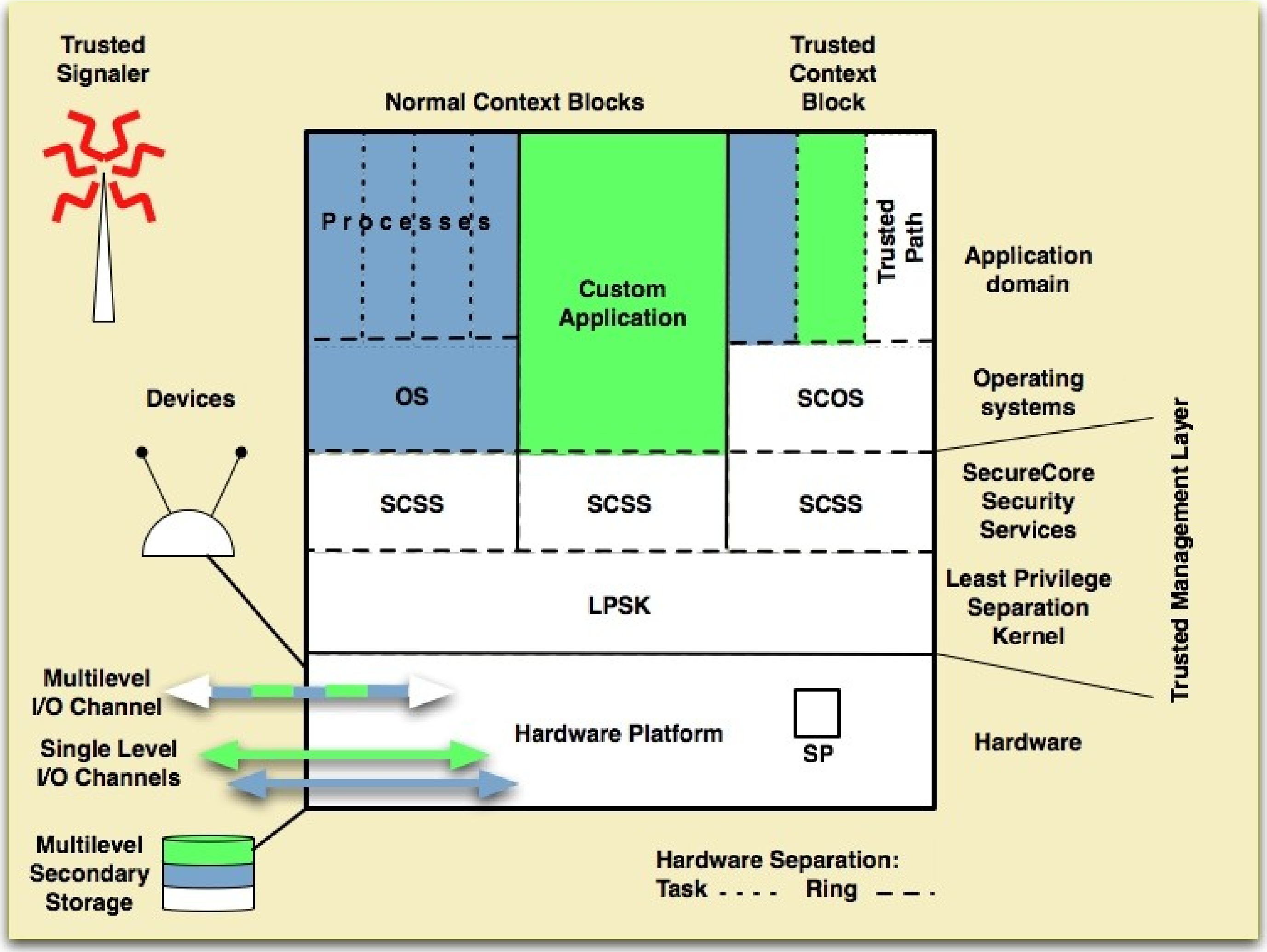
Outline

- Why are we talking about this here?
- What is a separation kernel?
- What is the LPSK?
- Progress with the LPSK
- Future work
- Demo

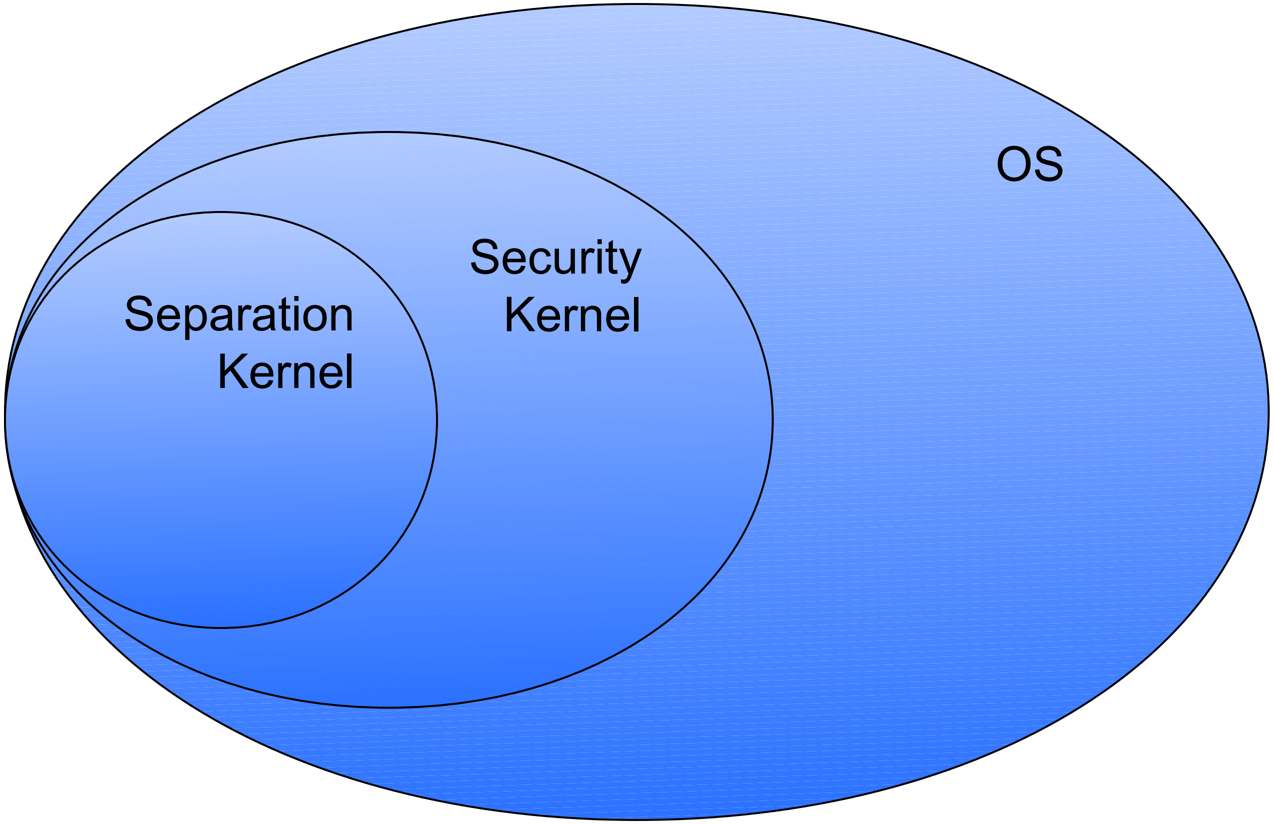
Digression…

- I think PowerPoint (and its ilk) are greatly misused.
- Therefore…

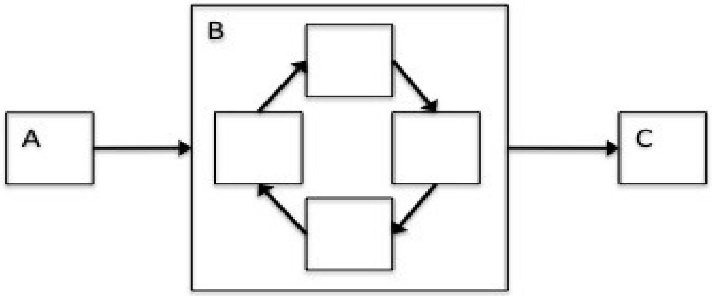
What is the relevance?



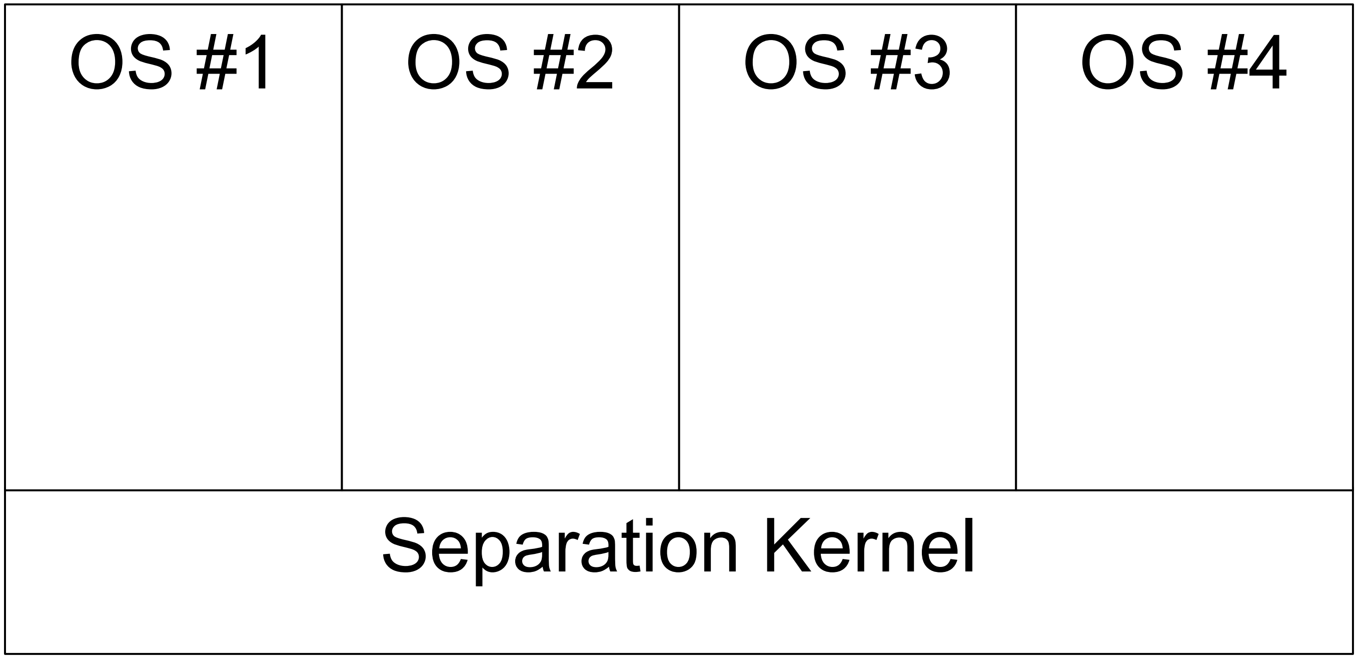
What is a Separation Kernel?



Partition Flow



As a VMM



OS #1

OS #2

OS #3

OS #4

Separation Kernel

Separation Kernel Protection Profile (SKPP)

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Least Privilege Separation Kernel (LPSK)

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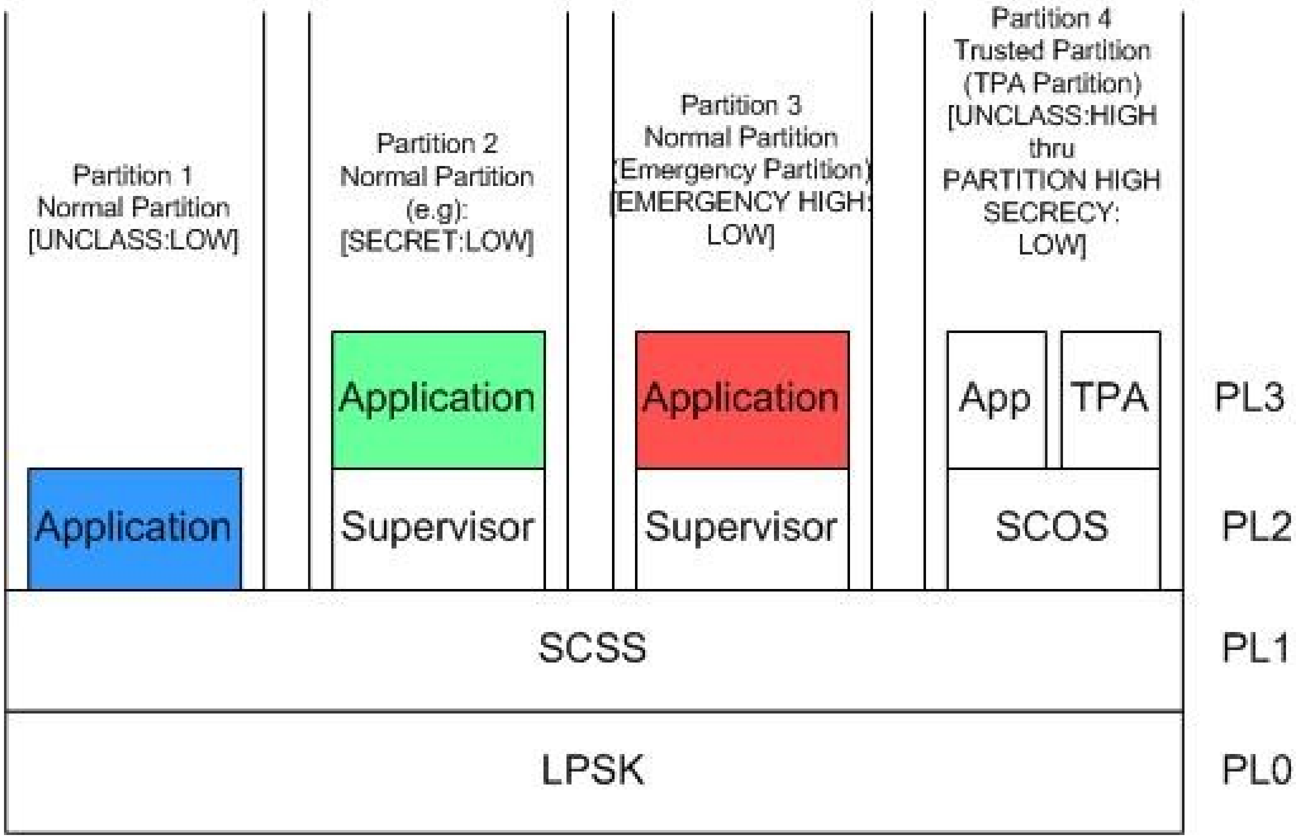
Phase 1 LPSK Architecture



LPSK Config (1)

- **Audit**
  - Enabled?
  - Size of internal audit buffer
  - Action when audit is full
- **Run-time LPSK**
  - How shall kernel use the screen?
  - Reserved memory locations

LPSK Config (2)

- **Partitions**
  - ❑ Round robin duration for all partitions
  - ❑ For each partition
    - Active?
    - Percent of round robin duration
    - Percent of system RAM
  - ❑ Partition with initial I/O focus
  - ❑ Partition to handle SAK

LPSK Config (3)

- **Partition flow rules**
  - Processes in Partition ‘x’ can access Partition ‘y’ (RO or RW)
  - Acyclic flow rules

LPSK Config (4)

- Imported files from disk
  - Location on disk
  - Home partition
  - Assigned PL
  - Audited events

LPSK Config (5)

- **RAM segments**
  - Size
  - Home partition
  - Assigned PL
  - Audited events

LPSK Config (6)

- Devices
  - Data channel or control channel
  - Home partition
  - Multiplexed or dedicated
  - Device specific attributes (e.g., keyboard buffer size)
  - Audited events

LPSK Config (7)

- Processes
  - Home partition
  - % of partition time slice
  - Subject defintions
    - Code location and PL assignment
    - Kernel APIs allowed to use
    - Subject-to-resource flows allowed
    - (e.g., subject x can access device y)
    - Audited events

Funded Objective

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Progress Report

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What the Prototype has now

- Kernel config options
- Multitasking processes
- Segmented memory
- Device drivers for:
  - Disk drives (PATA/SATA)
- Inter-process communication using:
  - Eventcounts
  - Sequencers
  - Signals
  - Shared memory
- Kernel event auditing
- I/O focus

Outside the LPSK

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Future Work

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Demo

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