TUD OPERATING SYSTEMS GROUP

2014

HERMANN HÄRTIG + MITARBEITER
SUMMER 2014
CRITICAL?

Criteria

- Real-Time
- Secure
- Fault Tolerant (Romain)
- High Performance Computing (FFMK)

Critical and Uncritical share resources
nearly 2 billion Qualcomm boards

Cellphone Baseband processors
Find out why 5 OF THE WORLD’S LARGEST RETAILERS trust us to protect them from cyber attacks

The New Threat Landscape
Traditional signature-based security won't protect you from zero-day and targeted APT attacks.

The FireEye Threat Prevention Platform
The FireEye platform fills the security holes left wide open by next generation firewalls, IPS, gateways, and AV.

Over 95% of Companies Compromised*
Contact us today for a trial of FireEye products, support, and services. Or, contact us if you have been breached and need immediate assistance.
Linux OS:
files, storage, IO, ....
L4: 3 ABSTRACTIONS

- thread
- thread

address space

thread
thread

L4 Microkernel
MESSAGE PASSING

App <-> Application

File  Storage  I/O

L4 Microkernel
COMPLEX MONOLITH

App A

File
Disk

Syscalls
Commodity OS Kernel
IP Stack
WiFi
USB

App B

File
Disk

Syscalls
Commodity OS Kernel
IP Stack
WiFi
USB

App C

File
Disk

Syscalls
Commodity OS Kernel
IP Stack
WiFi
USB

App D

File
Disk

Syscalls
Commodity OS Kernel
IP Stack
WiFi
USB

Storage

Härtig, Building Blocks for an Exa-Scale Operating System, ROSS 2014
Härtig, Building Blocks for an Exa-Scale Operating System, ROSS 2014
HYBRID SYSTEM

real-time

security: small Trusted Computing Base

resilience: small Reliable Computing Base
HYBRID SYSTEM

uncritical complex

Service OS

File Storage I/O

L4 Microkernel

critical simple
RT VIRTUAL MACHINES

Proxy

Linux

Display

Storage

I/O

RT App

RTOS

L4 Microkernel

Härtig, Building Blocks for an Exa-Scale Operating System, ROSS 2014
FT (ASTEROID)

Replicate

Replicate

Replicate

ROMAIN

L4 Microkernel
HPC (FFMK)

- MPI Application
- MPI Library
- L4 MPI-RT
- L4 InMemoryFS
- Linux ExtremeFS
- Linux MPI-RT
- MosiX Module

L4 Microkernel

- Compute Core
- Compute Core
- Compute Core
- Service Core
- Service Core
Software Architecture
- energy-adaptive stack

Run-time Optimization
- focus on energy efficiency
- using context information

Hardware Architecture
- new communication channels
- Distributed OS
- Real-Time Systems
- Microkernels (MKC+MOS)
- Scheduling-theorie
- Systems Complex Labs
- EZAG