Analisi delle performance del Linux Kernel Runtime Guardian

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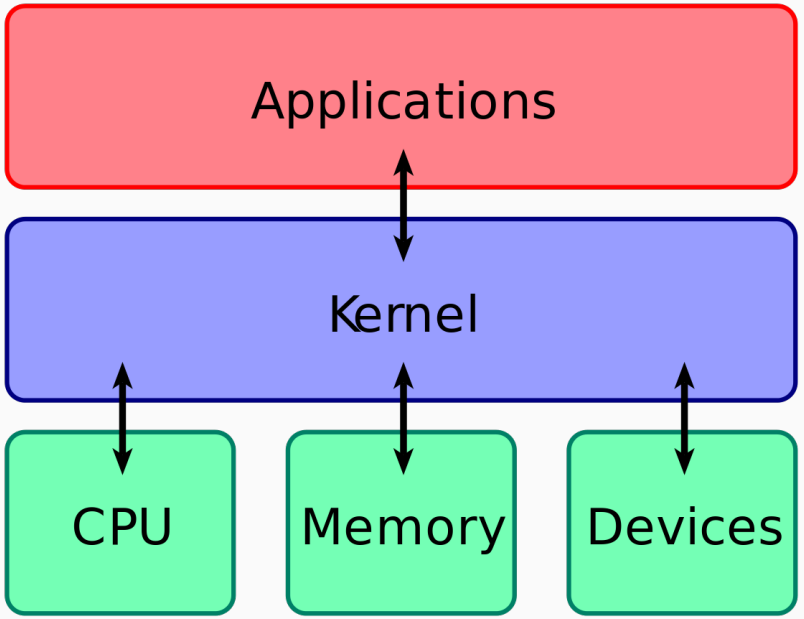
Corso di laurea in Ingegneria e Scienze Informatiche

Indice dei contenuti

Introduzione al sistema operativo

Kernel Linux

- Layer d'astrazione per memoria, CPU e periferiche
- Monolitico
- Composto da moduli



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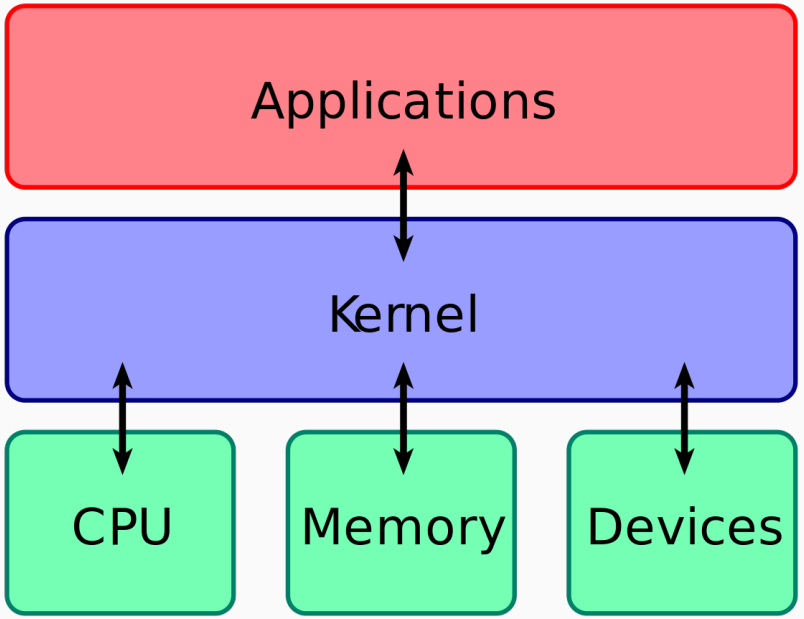

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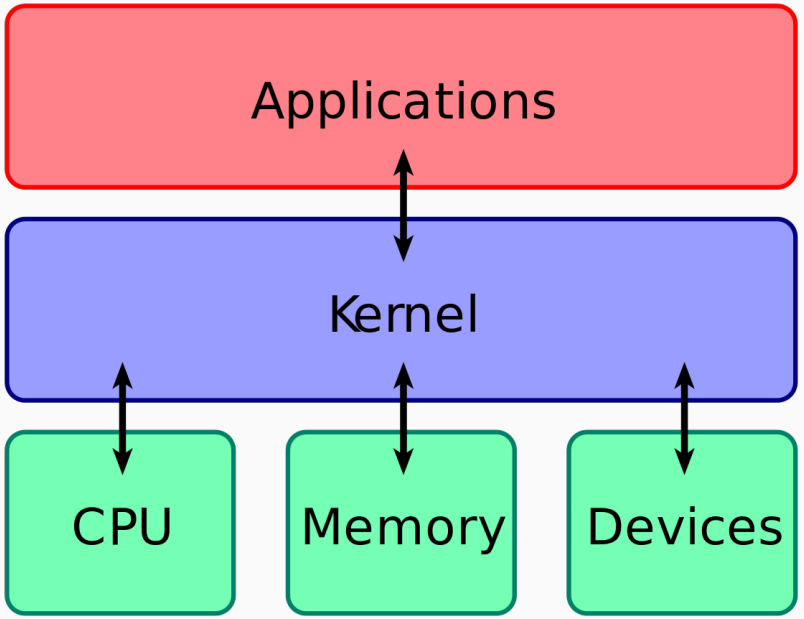
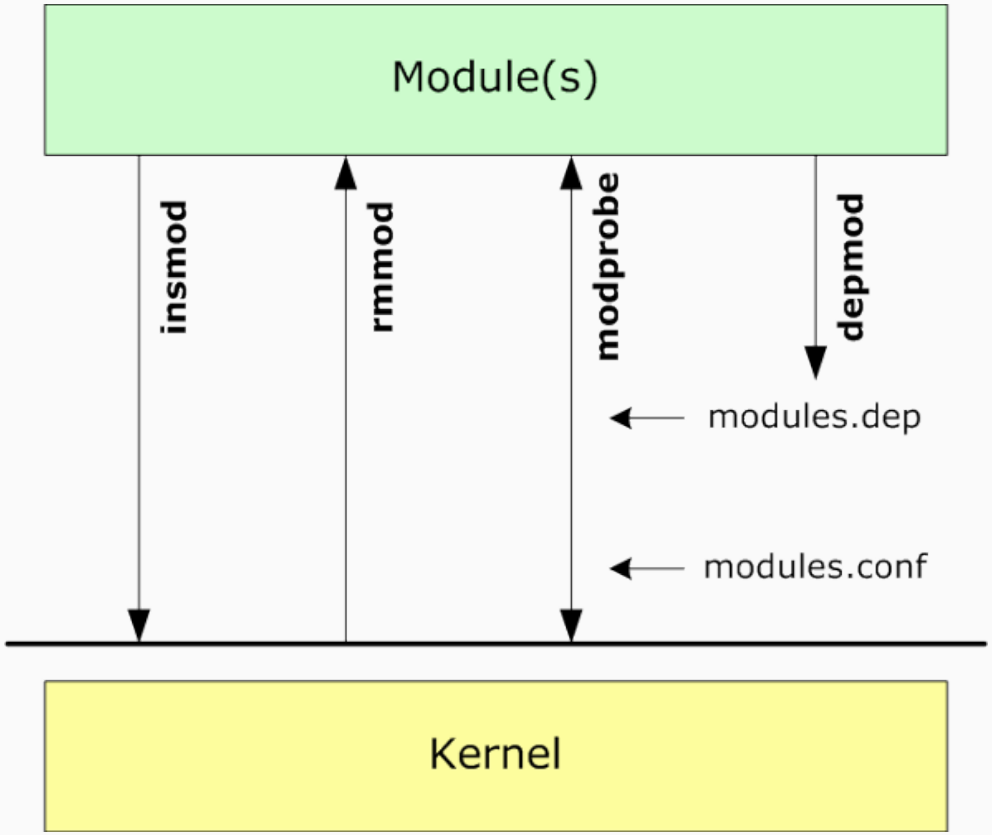


I moduli del kernel

- File oggetto caricati e rimossi a runtime
- Estendono le funzionalità del kernel



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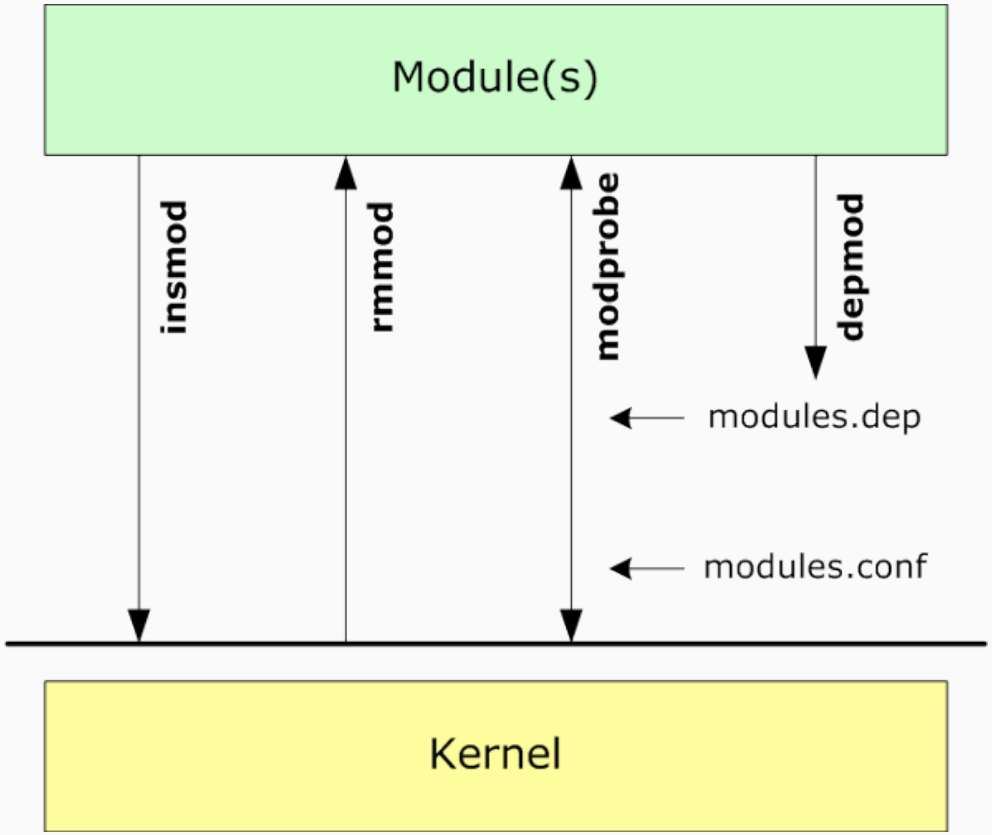
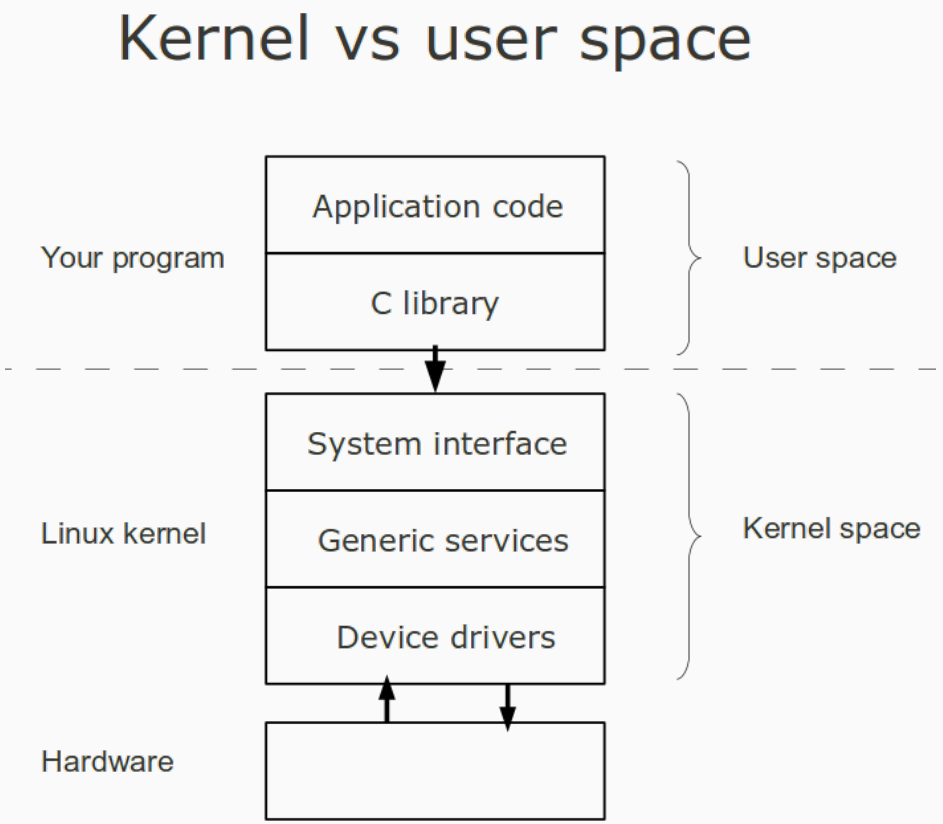
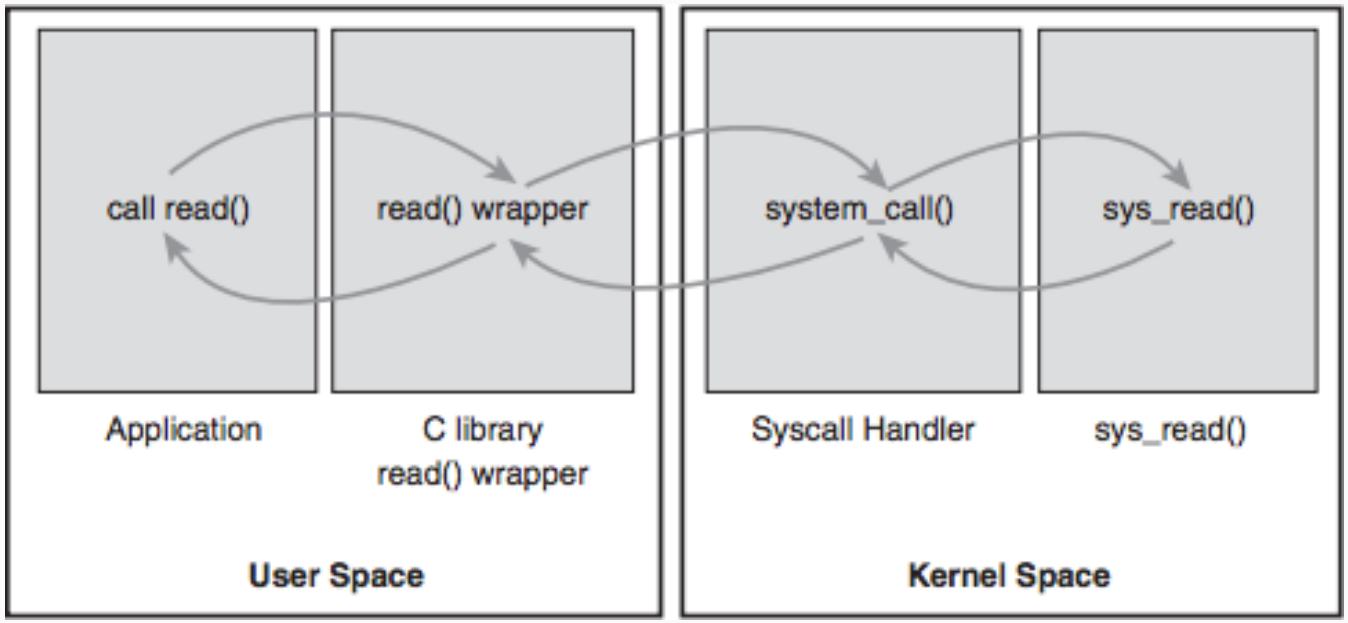


Spazi d’esecuzione



System call

Modalità per interagire con il sistema operativo



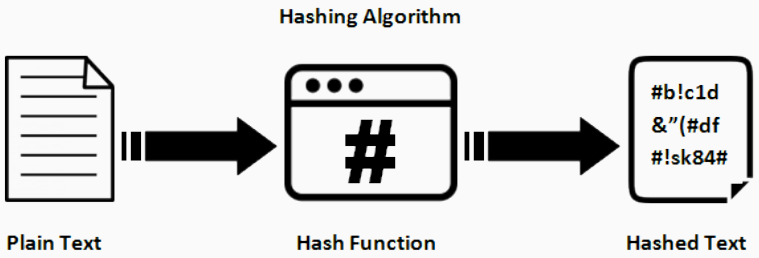
Linux Kernel Runtime Guardian

LKRG - Introduzione

È un modulo con l'obiettivo di eseguire controlli d'integrità del kernel e rilevare possibili attacchi di tipo 'exploitation'

LKRG - Funzionamento

- Salvataggio e confronto degli hash di alcune regioni del sistema
- Monitoraggio di alcune system call
- Routine di validazione a seconda degli eventi scatenati



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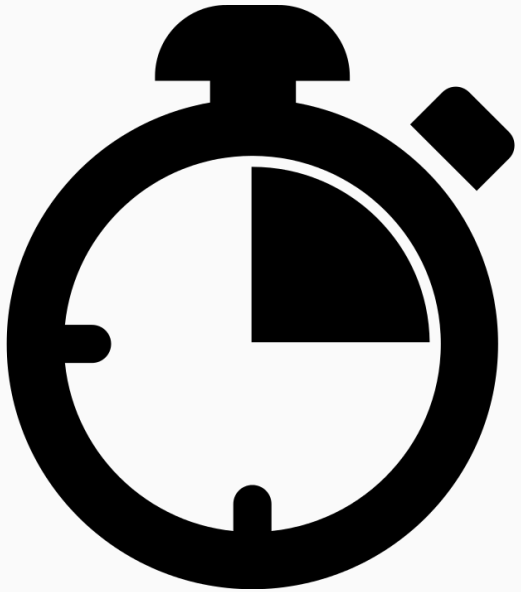
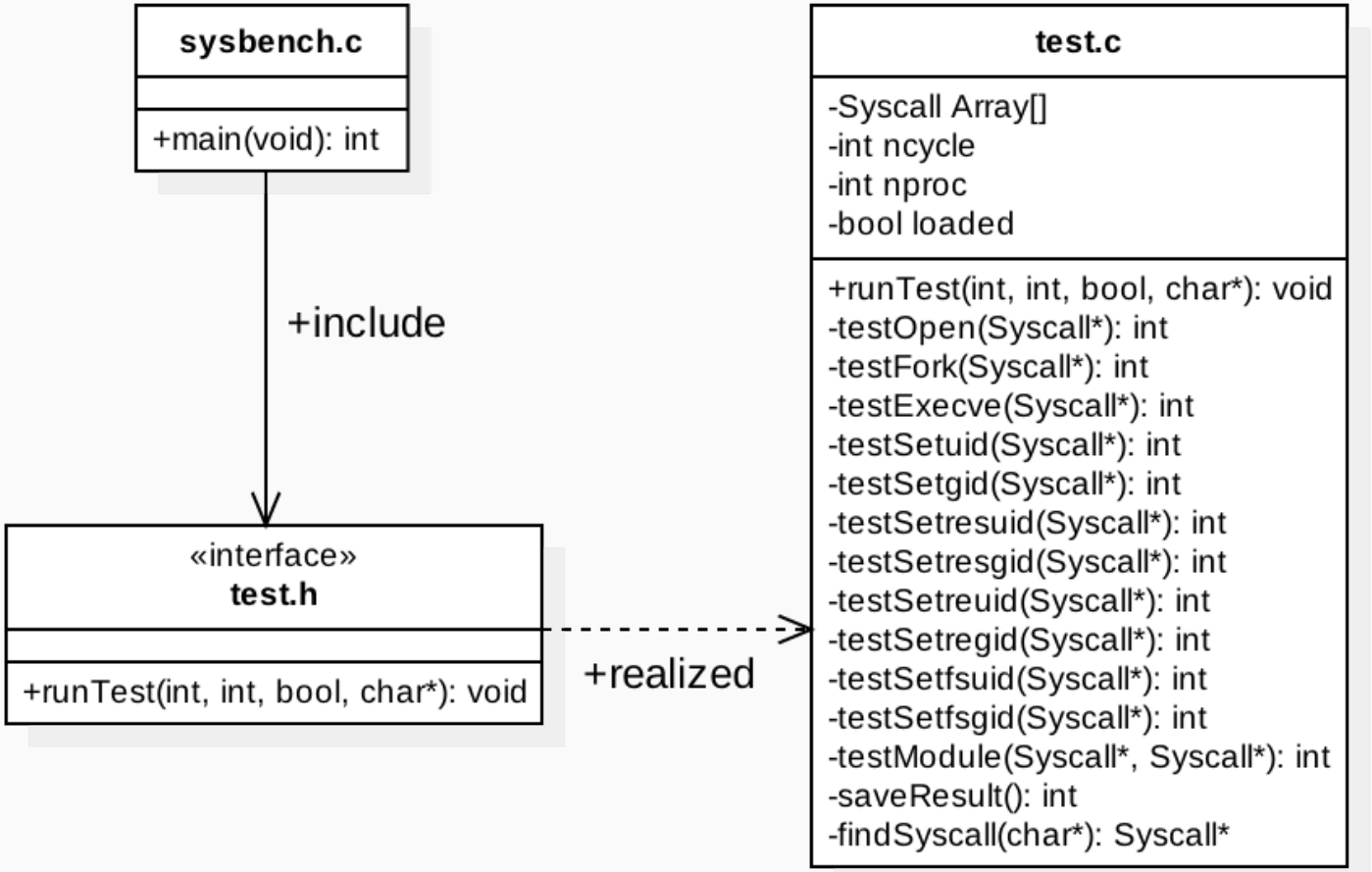
SysBench

SysBench - Obiettivo

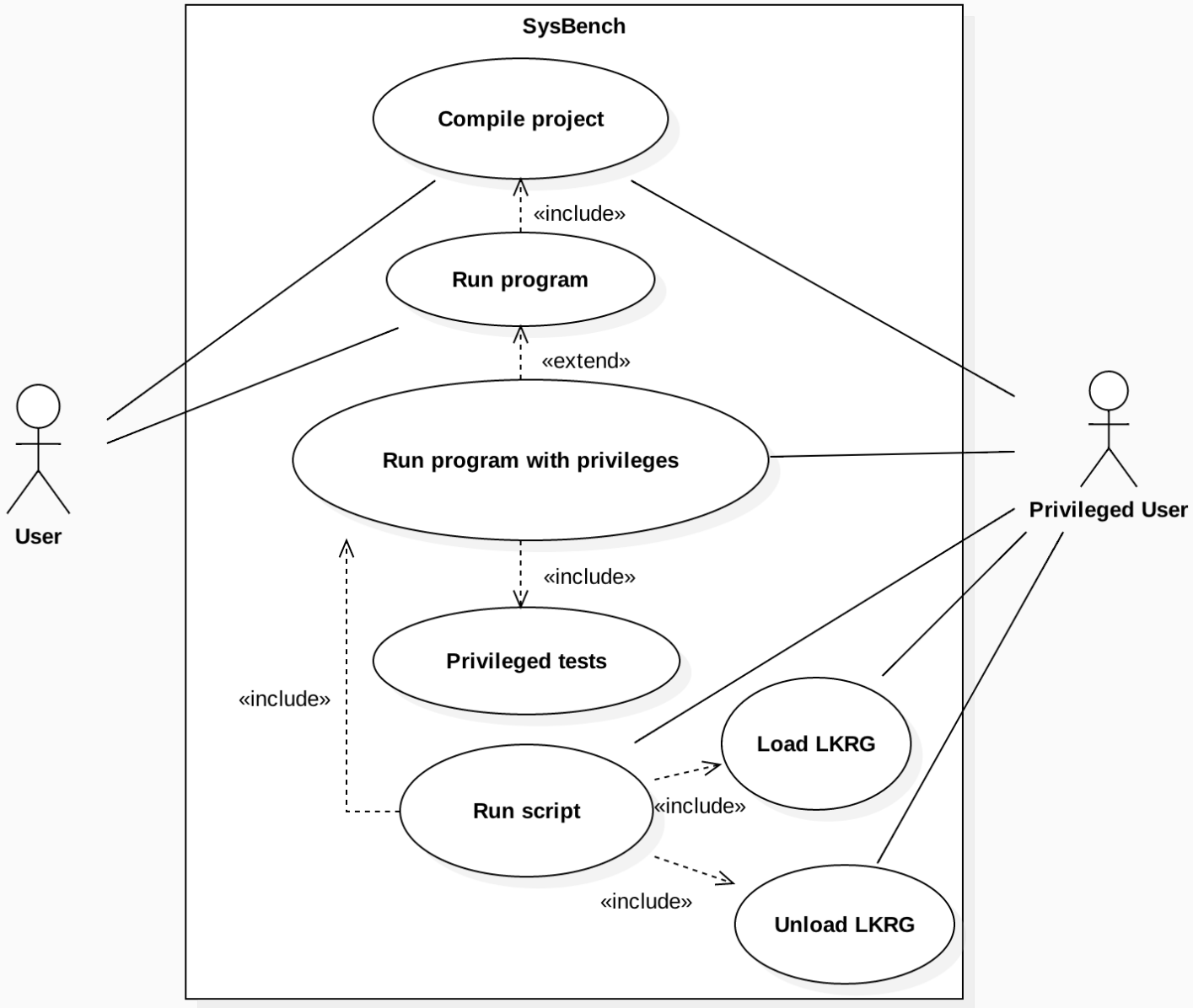
Software scritto il linguaggio C al fine di misurare il tempo d’esecuzione di alcune system call monitorate dal Linux Kernel Runtime Guardian



SysBench - Architettura



SysBench - Caso d’uso



Analisi dei risultati ottenuti

Analisi - Informazioni dei sistemi

Host macOs High Sierra

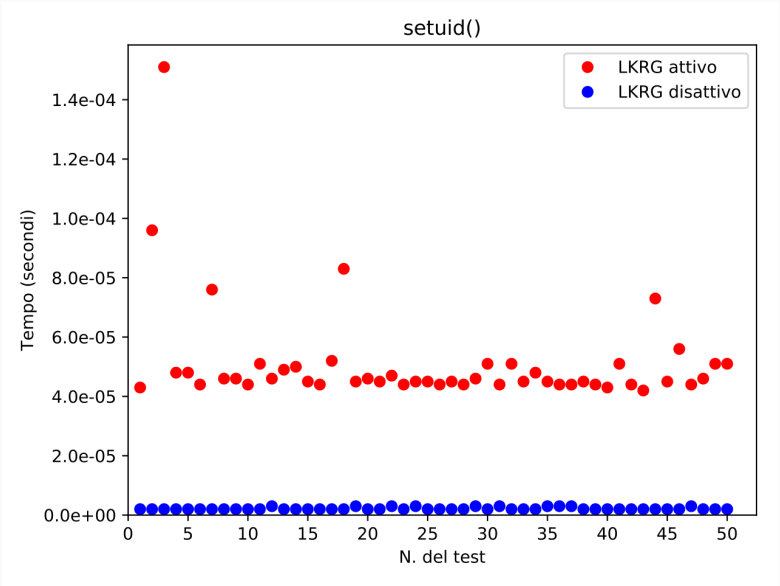
Guests Linux

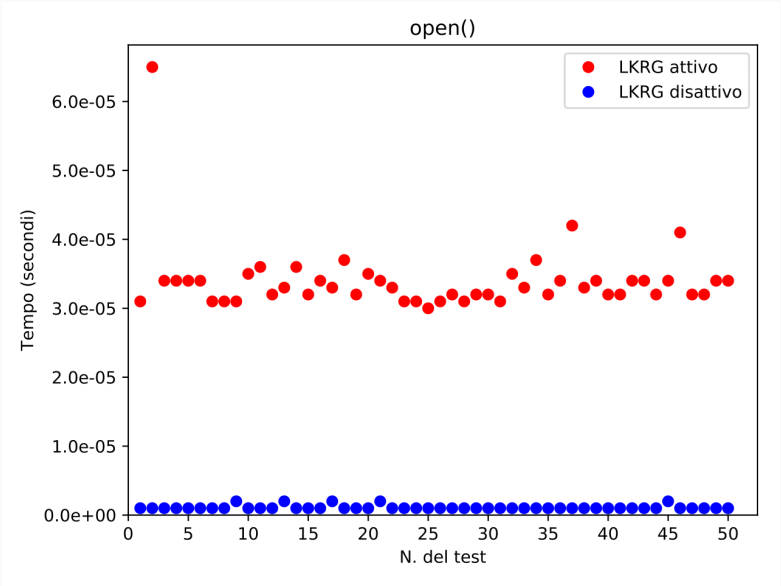
Ubuntu

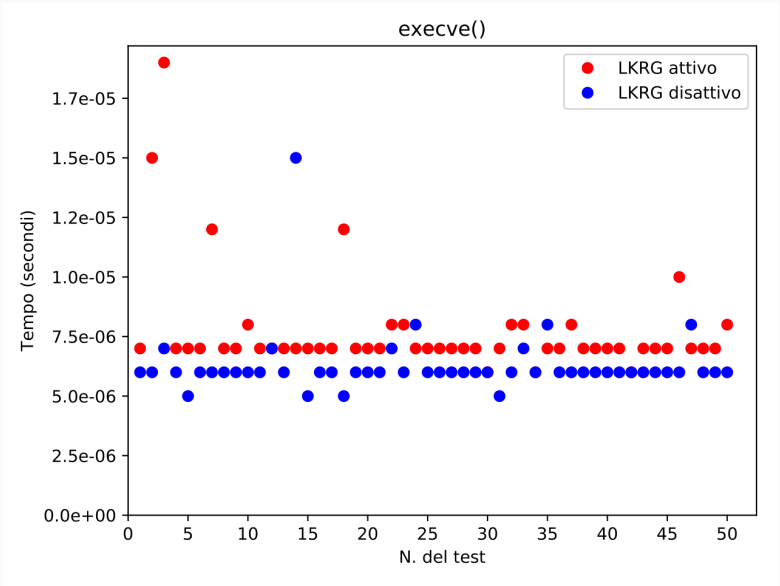
Debian

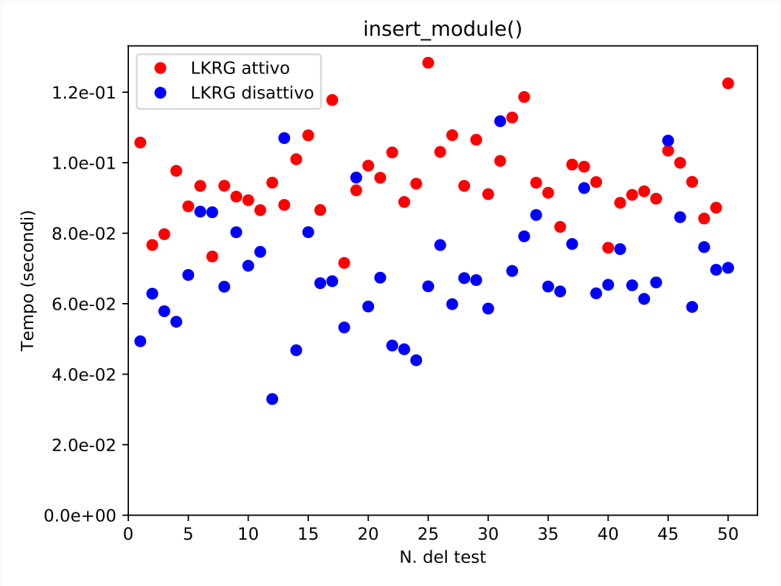
Mint

Analisi - Test in Ubuntu

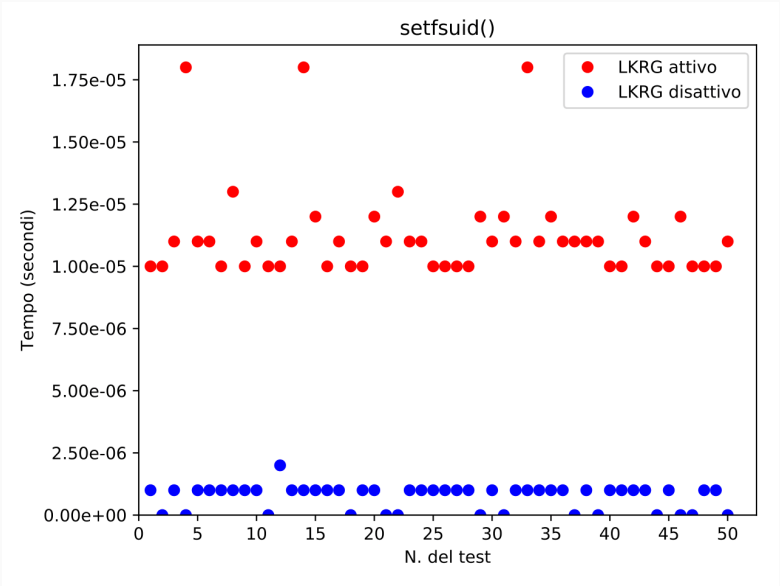


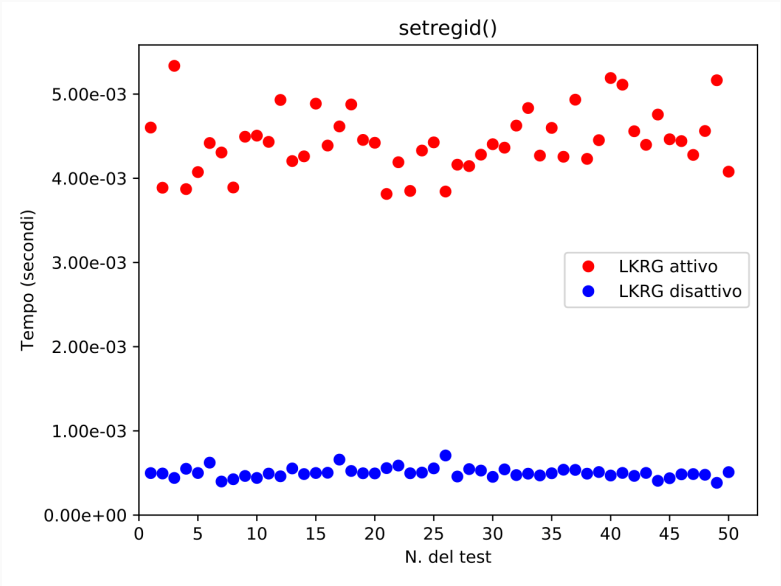


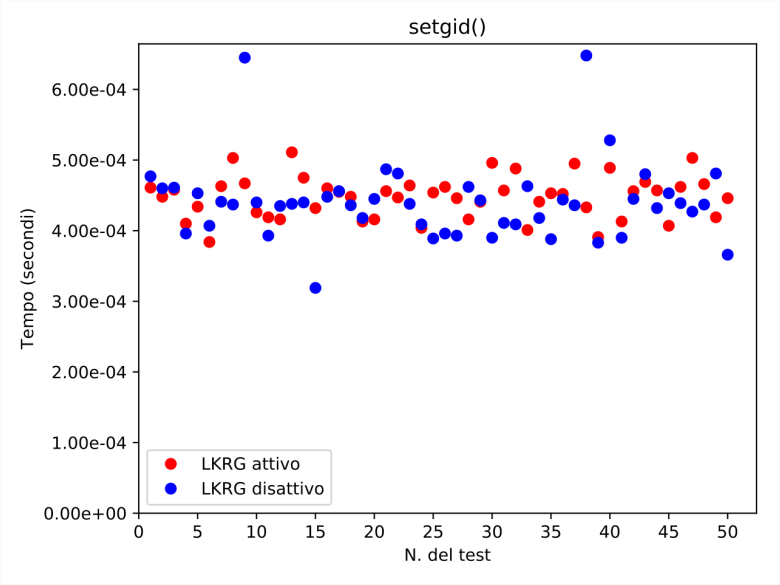


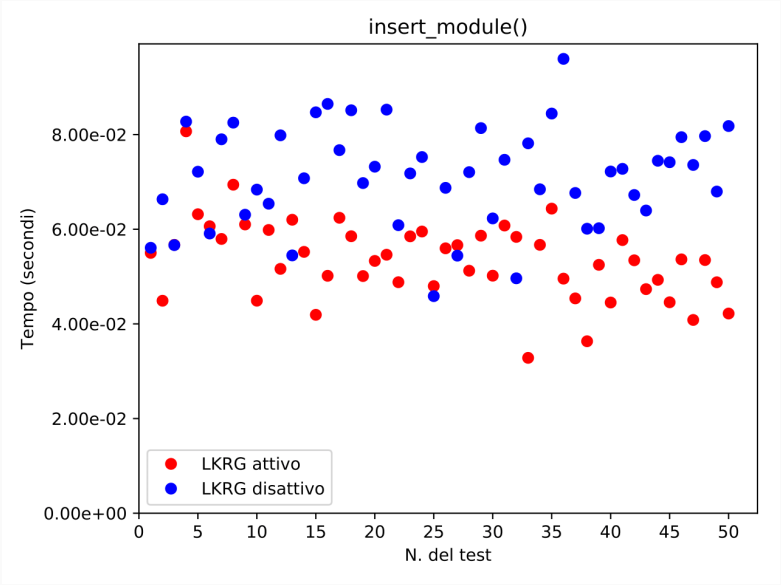


Analisi - Test in Debian

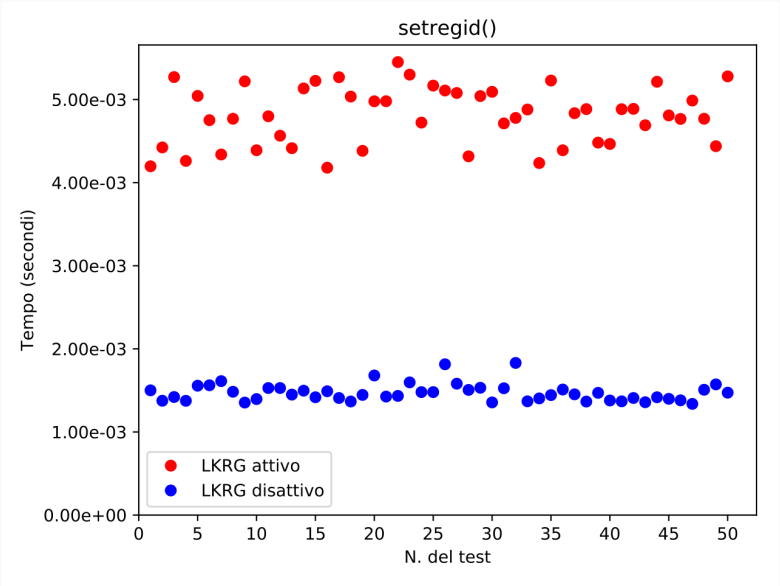


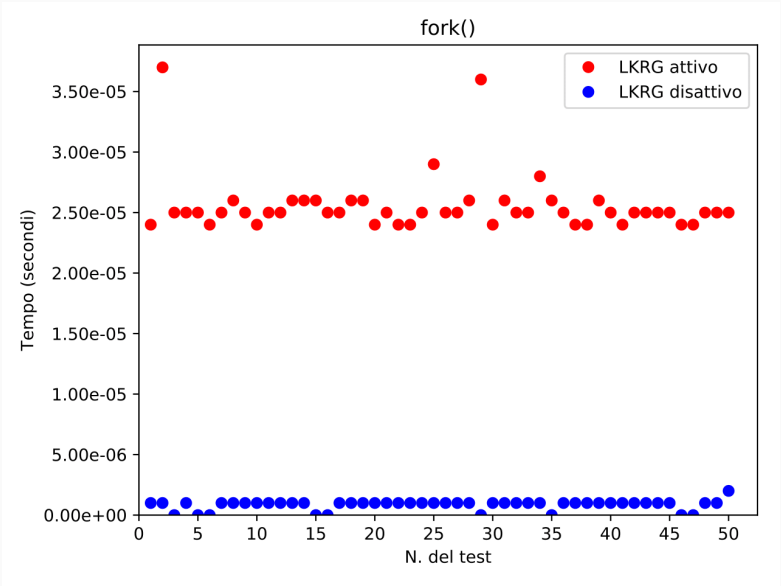


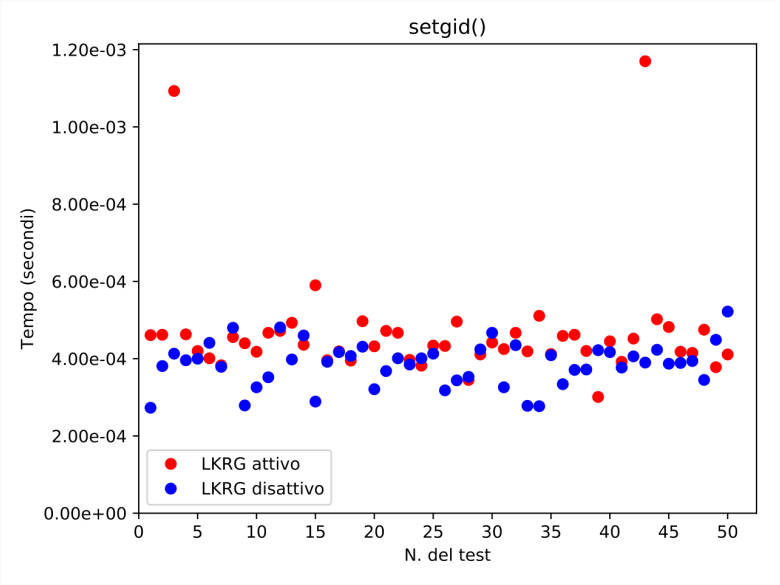


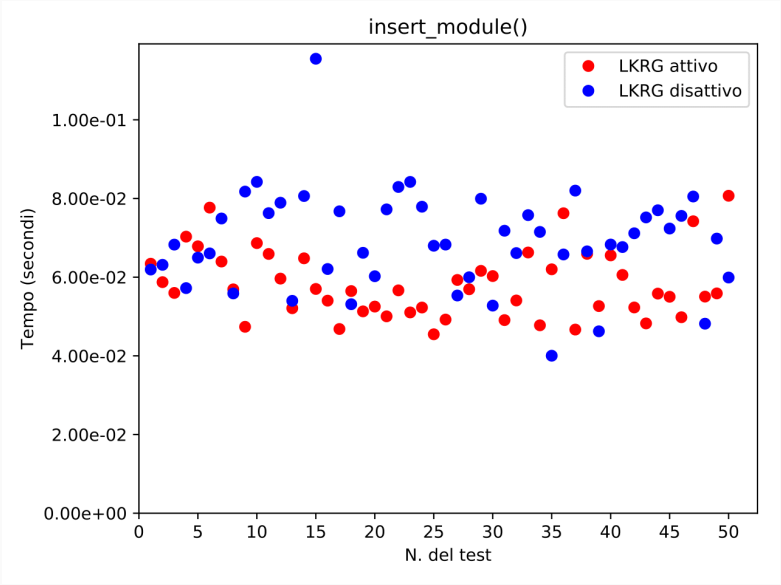


Analisi - Test in Mint







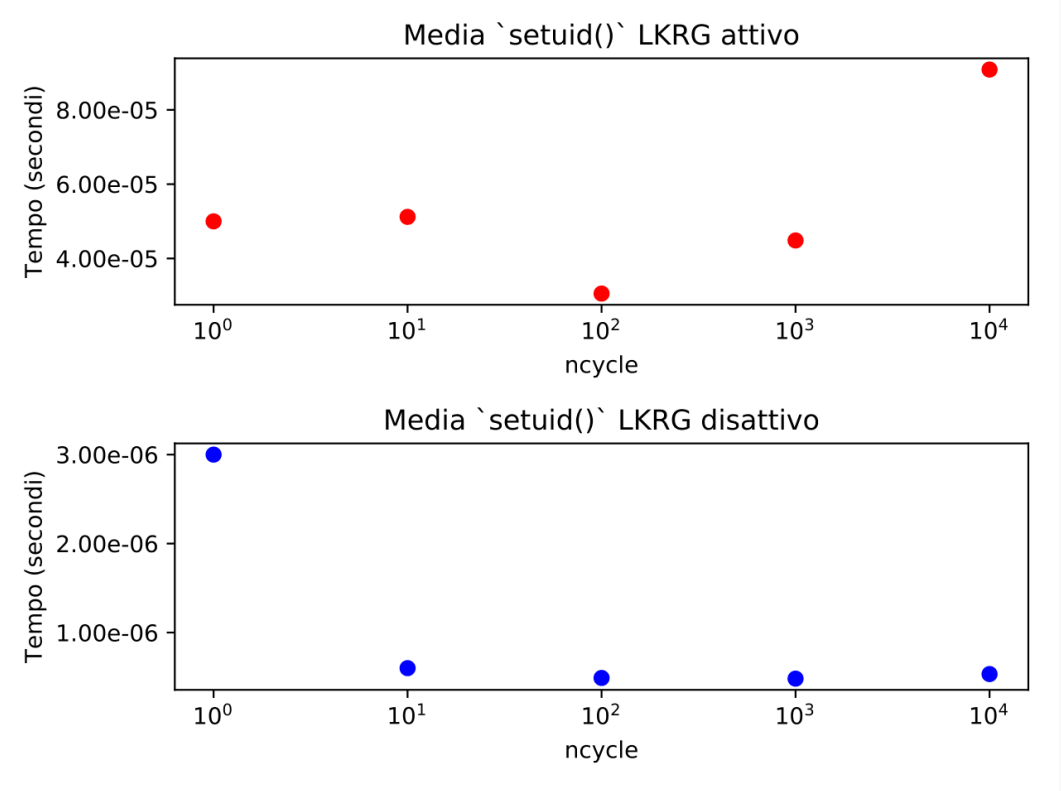


Analisi - Sistemi a confronto

SystemCall	Δ Ubuntu (%)	Δ Debian (%)	ΔMint (%)
setuid()	2332	2193	1875
setgid()	213	102	121
setresuid()	3659	735	2328
setresgid()	296	1597	365
setreuid()	3144	1478	2136
setregid()	283	884	327
setfsuid()	3406	1519	3347
setfsgid()	3824	1861	4746
open()	3089	1978	3051
fork()	2792	1906	3043
execve()	123	143	115
insert_module()	137	75	84
delete_module()	3432	1411	3581
Media	2056	1222	1932

Analisi - Ottimizzazioni

- Influenza rilevante di LKRG
- Influenza irrilevante di LKRG



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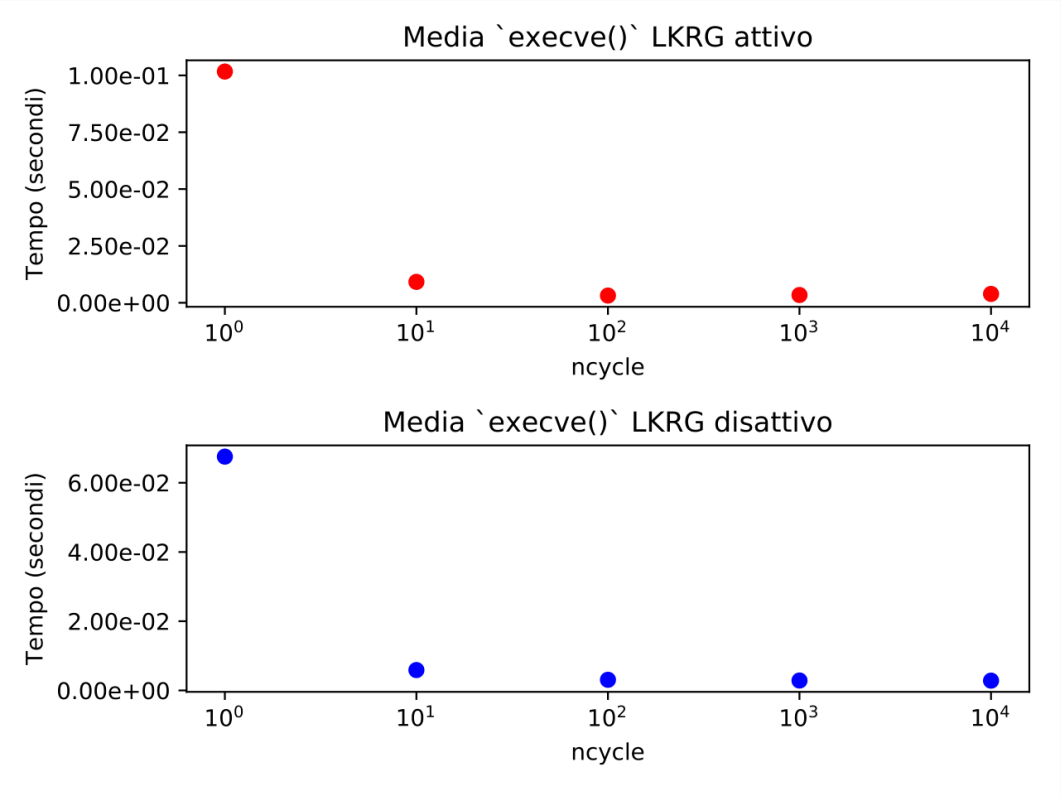

Conclusioni

Ringraziamenti

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- Gabriele D'Angelo
- Rosanna, Fabrizio e Francesco
- Catarina
- Tutti gli amici più cari
- CeSeNA Security Team

FINE

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