ΠΑΡΟΥΣΙΑΣΗ

ΔΙΔΑΚΤΟΡΙΚΗΣ ΔΙΑΤΡΙΒΗΣ

ΗΜΕΡΟΜΗΝΙΑ: Τρίτη, 8 Ιουνίου 2021

ΩΡΑ: 10:00 – 13:00

ΑΙΘΟΥΣΑ: Η παρουσίαση θα πραγματοποιηθεί εξ αποστάσεως, μέσω της πλατφόρμας MS Teams.
Σύνδεσμος συμμετοχής ***https://bit.ly/33Qx9pp***

ΟΜΙΛΗΤΗΣ: Γεώργιος Καππές

Θ έ μ α

«User-level Services for Multitenant Isolation»

Επταμελής Εξεταστική Επιτροπή:

1. **Αναστασιάδης Στέργιος** (Επιβλέπων), Αναπληρωτής Καθηγητής, Τμήμα Μηχανικών Η/Υ & Πληροφορικής, Πανεπιστήμιο Ιωαννίνων
2. **Νικολόπουλος Σταύρος**, Καθηγητής πρώτης βαθμίδας, Τμήμα Μηχανικών Η/Υ & Πληροφορικής, Πανεπιστήμιο Ιωαννίνων
3. **Τσαπάρας Παναγιώτης**, Αναπληρωτής Καθηγητής, Τμήμα Μηχανικών Η/Υ & Πληροφορικής, Πανεπιστήμιο Ιωαννίνων
4. **Δημακόπουλος Βασίλειος**, Αναπληρωτής Καθηγητής, Τμήμα Μηχανικών Η/Υ & Πληροφορικής, Πανεπιστήμιο Ιωαννίνων
5. **Δελής Αλέξιος**, Καθηγητής πρώτης βαθμίδας, Τμήμα Πληροφορικής και Τηλεπικοινωνιών, ΕΚΠΑ
6. **Καλογεράκη Βασιλική**, Καθηγήτρια πρώτης βαθμίδας, Τμήμα Πληροφορικής, Ο.Π.Α.
7. **Κοζύρης Νεκτάριος**, Καθηγητής πρώτης βαθμίδας, Σχολή Ηλεκτρολόγων Μηχανικών & Μηχανικών Υπολογιστών, ΕΜΠ

ΤΜΗΜΑ ΜΗΧΑΝΙΚΩΝ Η/Υ & ΠΛΗΡΟΦΟΡΙΚΗΣ
ΠΑΝΕΠΙΣΤΗΜΙΟ ΙΩΑΝΝΙΝΩΝ

Τ.Θ. 1186, ΙΩΑΝΝΙΝΑ 45110
Τ: 265100 8817 - 8813 - 7196
http:/www.cse.uoi.gr/

DEPT. OF COMPUTER SCIENCE & ENGINEERING
UNIVERSITY OF IOANNINA

P.O. BOX 1186, IOANNINA
GR - 45110 GREECE
T: +30 265100 8817 - 8813 - 7196
http:/www.cse.uoi.gr/

Π ε ρ ί λ η ψ η:

In modern cloud environments, virtualization enables multiple tenants to flexibly share the datacenter manycore machines with high processing and memory capacity. Operating-system containers are a lightweight form of virtualization that is commonly used to run the data-intensive applications of different tenants in cloud infrastructures, because they offer flexible virtualization with low overhead.

At a high level, two main reasons make this sharing challenging. First, the system kernel of a cloud machine serving software containers can become a performance bottleneck and an attack surface for the colocated tenants. Second, the secure management of the enormous user populations that belong to different tenants in a cloud environment necessitates the design of scalable and tenant-aware access control policies at the infrastructure-level.

The focus of this dissertation is to enable multiple tenants to efficiently and securely share the computing, storage, and network infrastructure of the datacenter. To this end, we take the radical approach of moving the data-intensive I/O services at user level from the shared kernel, in order to serve the containers of competing tenants over the same cloud machines. Our contributions consist of innovative methods to handle POSIX-like system calls at user level through a library, the producer-consumer transfer of data and requests over shared memory with efficient memory copy and relaxed lock-free queues, the construction of stacked user-level I/O services, and a multitenant access control mechanism built natively into a distributed filesystem.

This dissertation shows that it is possible to allow the data-intensive applications of different tenants to share the same datacenter machines with reduced contention for shared resources. The systems that we propose enable the cloud operation with lower cost, more predictable I/O latency and throughput, better resilience to attacks from colocated tenants, better performance for the end users under contention conditions, scalable and improved energy efficiency overall as a result of the higher hardware utilization achieved.

ΤΜΗΜΑ ΜΗΧΑΝΙΚΩΝ Η/Υ & ΠΛΗΡΟΦΟΡΙΚΗΣ
ΠΑΝΕΠΙΣΤΗΜΙΟ ΙΩΑΝΝΙΝΩΝ

Τ.Θ. 1186, ΙΩΑΝΝΙΝΑ 45110
Τ: 265100 8817 - 8813 - 7196
http:/www.cse.uoi.gr/

DEPT. OF COMPUTER SCIENCE & ENGINEERING
UNIVERSITY OF IOANNINA

P.O. BOX 1186, IOANNINA
GR - 45110 GREECE
T: +30 265100 8817 - 8813 - 7196
http:/www.cse.uoi.gr/