Funded by the Erasmus+ Programme of the European Union

**Project title**: Security Assurance of Docker Containers

**Number of students** (minimum 2)**: 2**

**Project duration** (1-6 months): 6

**Project frame** (Bachelor/Master, small project): Master

**Background:**

The atene KOM offers a broad variety of consultancy services to its customers, including strategic planning, project and network management, and application development. We develop tailored software packages combining document management systems with WebGIS-applications. Our development and deployment processes are constantly under review to adapt to new technologies. During the last years, especially the way of deploying software has gone through a great change within the industry, moving from virtual machines to containers. Here, at atene KOM GmbH we are on the edge to deploy container-based applications in production environments. Introducing these technologies on production level comes with new approaches and challenges meeting the high security standards of our clients.

**The challenge:**

This project / master thesis is a deep dive into containers and the way to deploy and secure them. On this journey, candidates are going to deal with the following:

• Security, firewalls, data privacy, access control

• DevOps (CI/CD pipelines) with focus on security testing

• Linux Kernel features (Cgroups, Namespaces, Seccomp)

• HTTPS and associated certificate/key management

• API, Secret Management, Microservices

• Docker, Docker-Compose

• Linux Security Modules (LSM): SELinux, AppArmor

For this project, we can outline two main objectives:

1. Hardening Docker Containers
* Research common vulnerabilities and attacks on images/containers
* Best practises to minimize attacks

→ **Result:** Build prototype images/containers applying best practises

1. Implement automated security test within CI/CD pipelines
* Research security testing engines in Continuous Integration CI / Continuous Deployment CD pipelines
* Define security tests and configure testing engines

→ **Result:** Implement security tests within a CI/CD pipeline

**The company:**

The Agency for Communication, Organisation and Public Management (atene KOM GmbH) offers Europe-wide consulting services for various topics of defining regional competitive profiles and innovation development. An inter-sectoral network of economists, scientists and engineers as well as decision makers from municipal and transregional public institutions all over Europe supports the work of atene KOM. With excellent networking and wide-ranging creative input, it is possible to always pick up new ideas, prepare and translate them into innovative projects. The atene KOM’s areas of expertise are regional development, broadband deployment and technologies, sustainable energy and education. The strengths of atene KOM lie in intercultural cooperation and the moderation of joint work of economy, politics and science.

Number of employees: >200

Head quarter: Berlin

Further locations: Osterholz-Scharmbeck, Wiesbaden, Leipzig, Stuttgart, Schwerin, München, Bonn, Brüssel

**Supervisor:**

Stephan Feller (s.feller@atenekom.eu) is a GIS software developer at atene KOM. After obtaining his diploma in geoscience, he worked for 8 years as a geophysicist in the oil and gas industry before he moved to GIS software development 3 years ago. He focused on building web-mapping solutions with container-based deployments and joined atene KOM mid 2017 in the department responsible for geospatial and software development.

**Candidate background:**

The candidates ideally hold Bachelor degrees in one of the following subjects: informatics or similar

The candidates should have knowledge of:

* Security, firewalls, data privacy, access control
* Virtualization technologies
* DevOps (CI/CD pipelines) with focus on security testing
* Linux Kernel features (Cgroups, Namespaces, Seccomp)
* HTTPS and associated certificate/key management
* API, Secret Management, Microservices
* Docker, Docker-Compose
* Linux Security Modules (LSM): SELinux, AppArmor

**References and complementary description:**

[**www.atenekom.eu**](http://www.atenekom.eu)