SOFTWARE ARCHITECTURE EVOLUTION OF A PHYSICAL SECURITY INFORMATION MANAGEMENT SYSTEM

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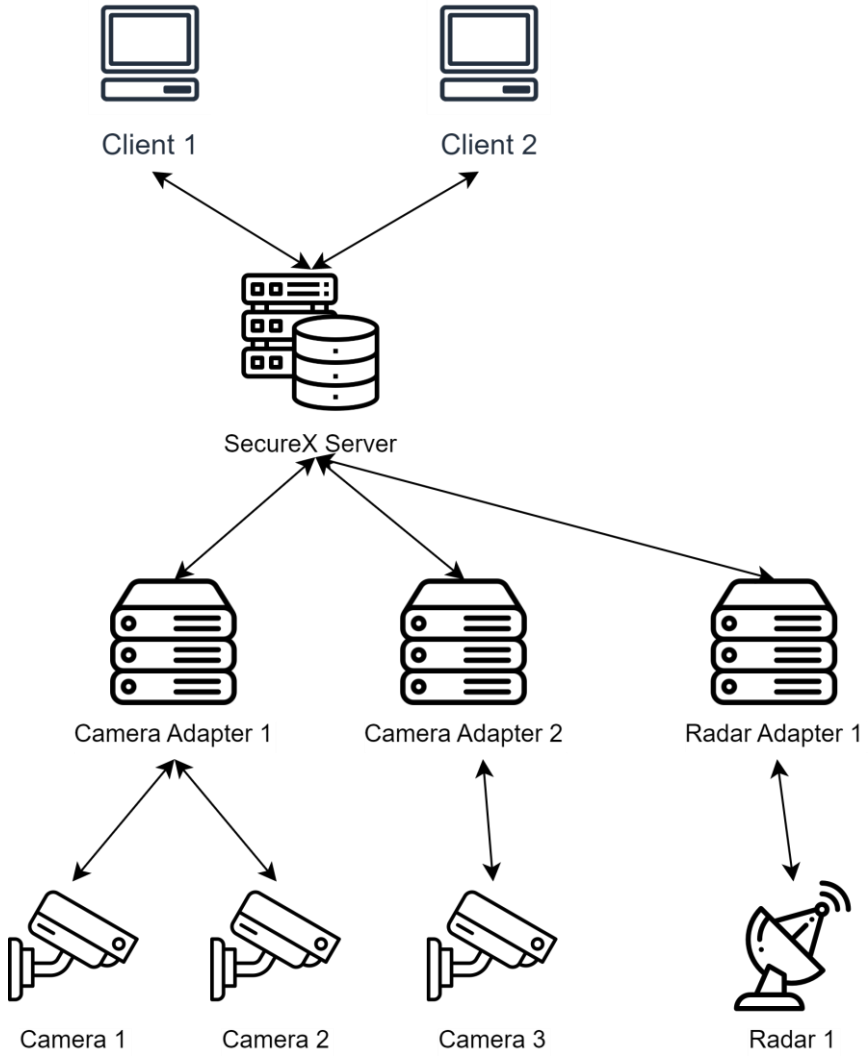
What is a Physical Security Information Management (PSIM) System?

- A PSIM system is a system to control and monitor independent security sensors and subsystems interconnectedly to protect facilities or open fields.
- Sensor could be cameras, radars or seismic detectors and subsystems could be access control systems or plate recognition systems etc.
- Could be used for the protection of country borders, airports, railways or any other critical facility.
- Key capabilities: Collection, Analysis, Verification, Resolution, Reporting

High Level Architecture of SecureX



What is the OSGi Framework?

- Open Services Gateway Initiative
- A Java framework to develop modular software.
- It allows installing, uninstalling and updating software components at runtime.
- Components are called «bundles» and they have their own lifecycles.
- OSGi framework is responsible for installing, starting, updating and uninstalling of these bundles.

Integration Problem

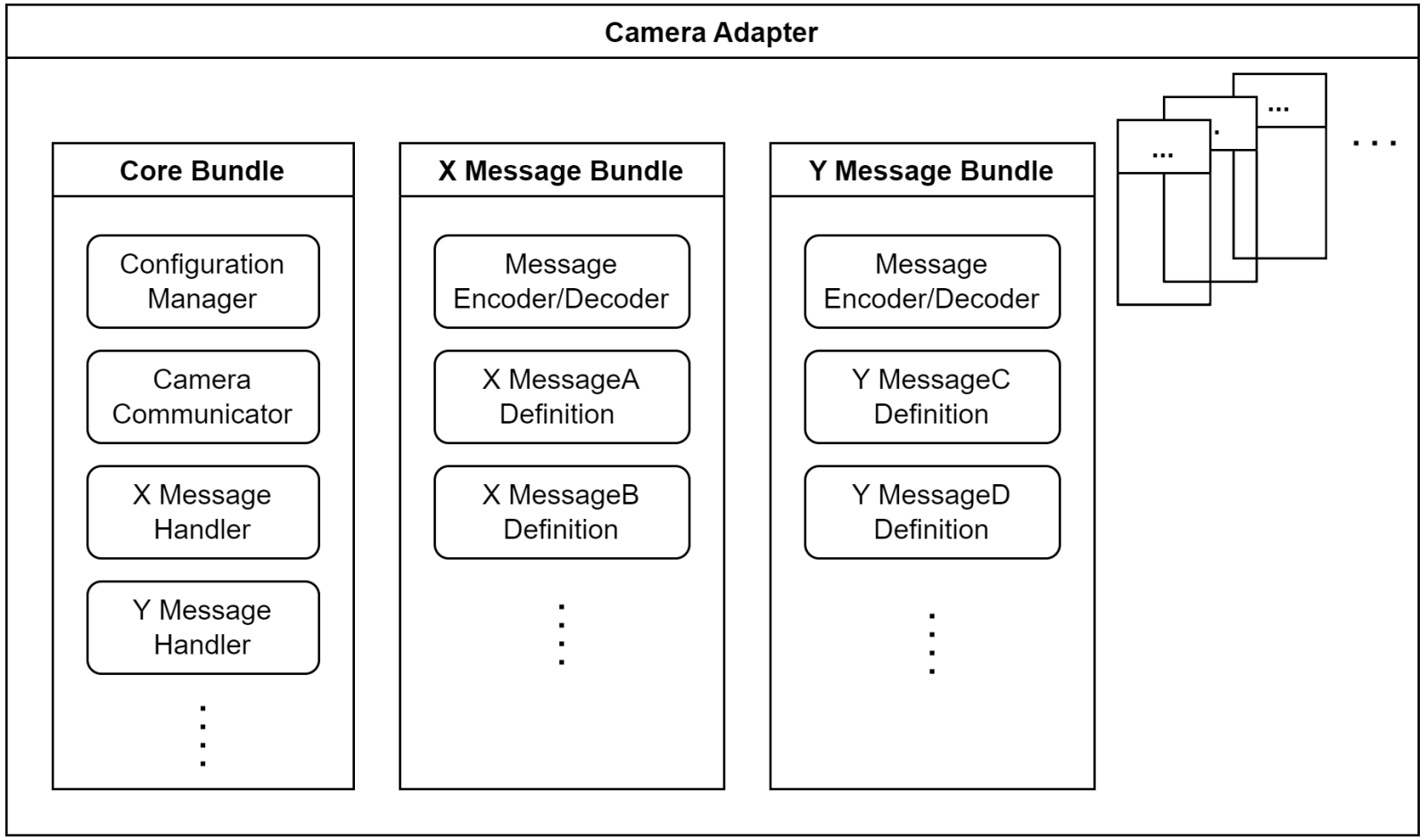
- PSIM systems need to work with different sensors and subsystems together
- New sensors/subsystems are developed and older ones gets updated frequently
- Sensor/subsystem integration is time consuming
- Testing with already integrated sensors/systems is not always easy or even possible
- Updating the deployed software components is difficult

Existing Solutions

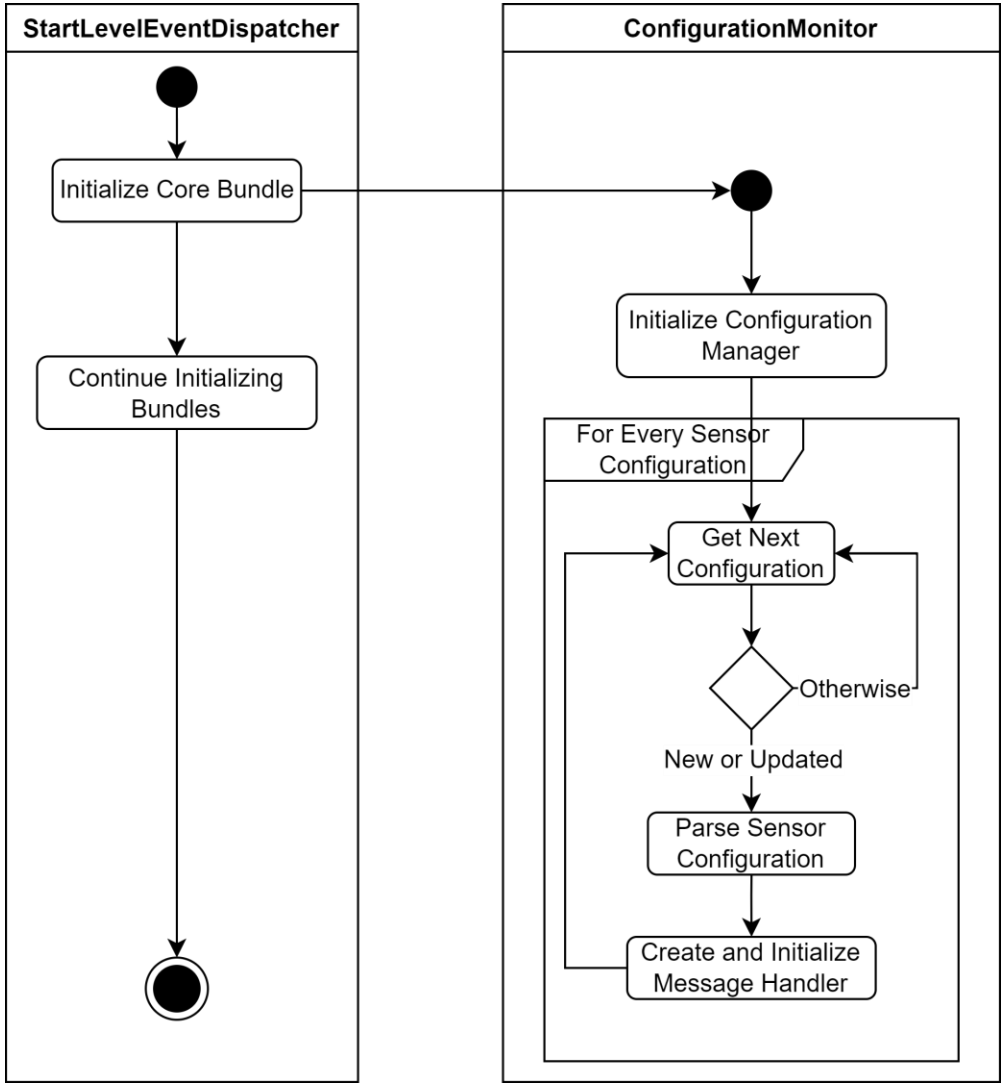
- Developing integration SDKs and APIs. Examples:
  - Milestone MIP SDK
  - Genetec Omnicast SDK

- Shortcomings:
  - Focusing only to the sensor integrations and not providing a solution for component selection to deploy according to the different customer requirements.

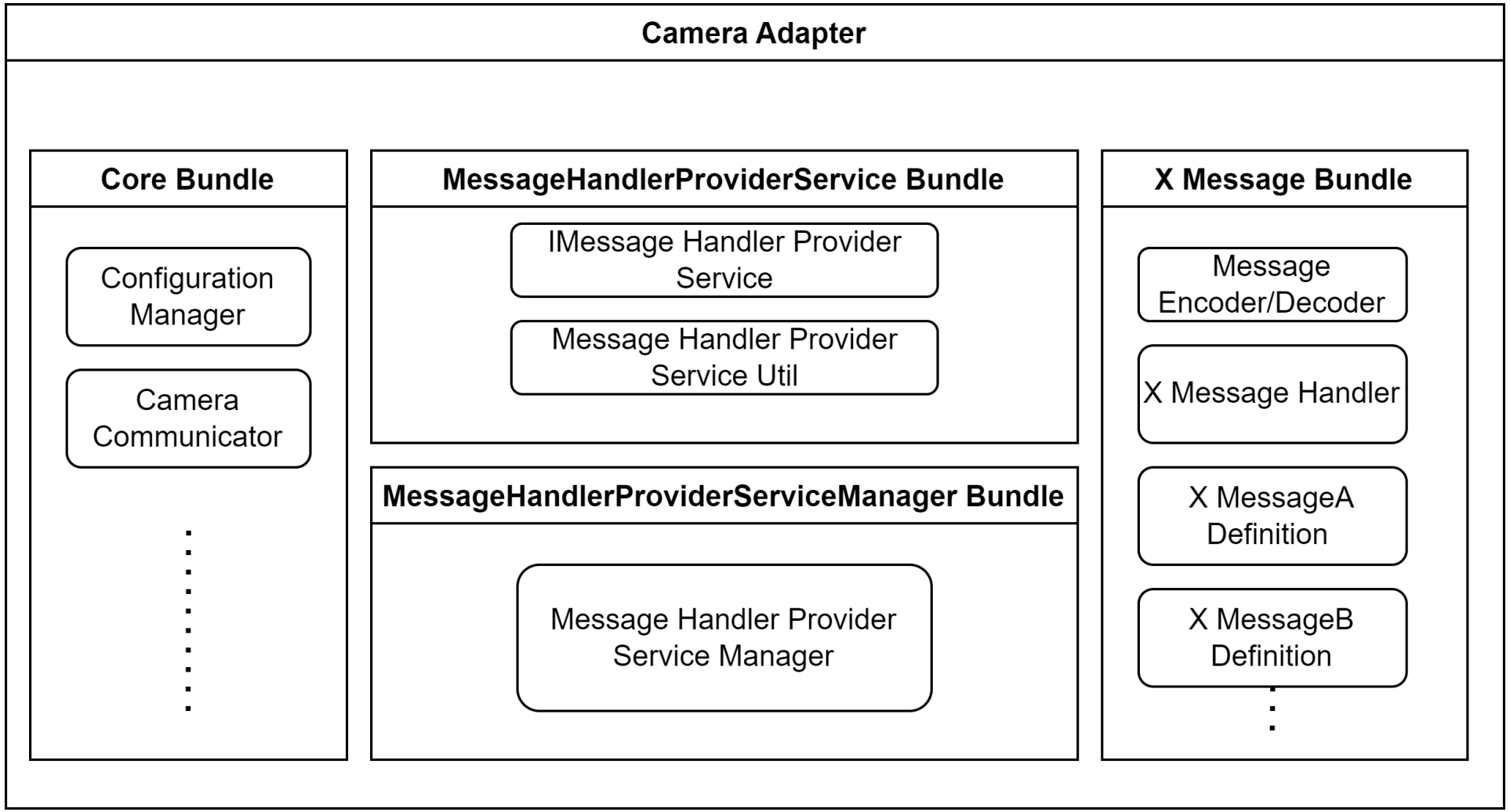
Current Adapter Architecture



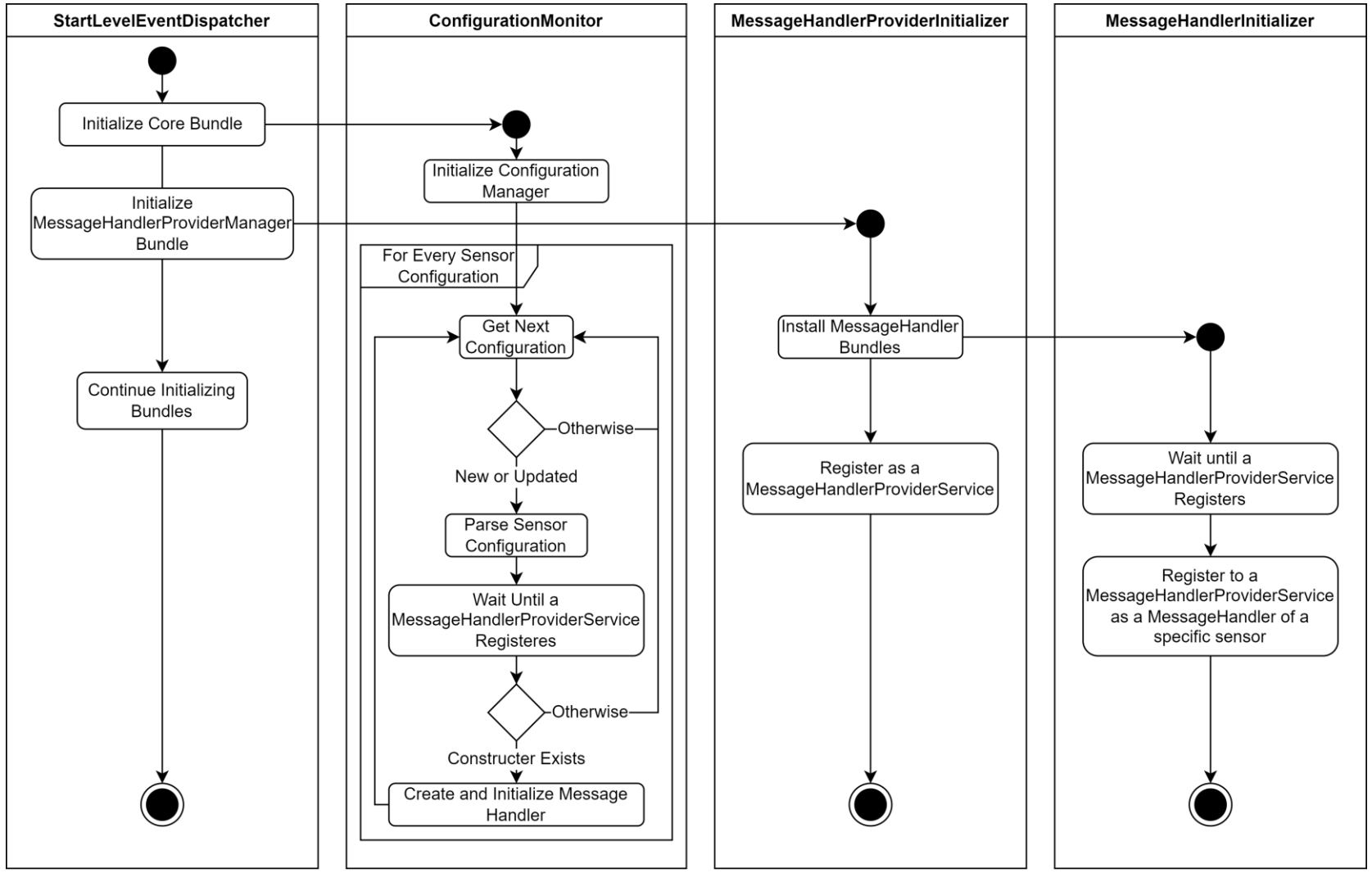
Current Message Handler Initialization



Proposed Architecture



Proposed Message Handler Initialization



Benefits

- Buildless integration
- Reduced test effort
- System updates require low bandwidth
- Unlike existing solutions, this approach is a step in architectural evolution towards a product line architecture
- No known disadvantages

References

- B. Tekinerdoğan, İ. Yakın, S. Yağız, and K. Özcan, "Product Line Architecture Design of Software-Intensive Physical Protection Systems". IEEE International Symposium on Systems Engineering (ISSE), 2020, pp. 1-8, doi: 10.1109/ISSE49799.2020.9272239.
- R. S. Hall, K. Pauls, S. McCulloch, and D. Savage. (2011) "OSGi in Action - Creating Modular Applications in Java". Manning Publications
- https://www.csoonline.com/article/2126002/physical-security-information-management--psim---the-basics.html
- https://www.ifsecglobal.com/psim/
- https://www.cmaktech.com/technology
- https://www.milestonesys.com/community/developer-tools/sdk/
- https://www.genetec.com/partners/sdk-dap

Thank You!