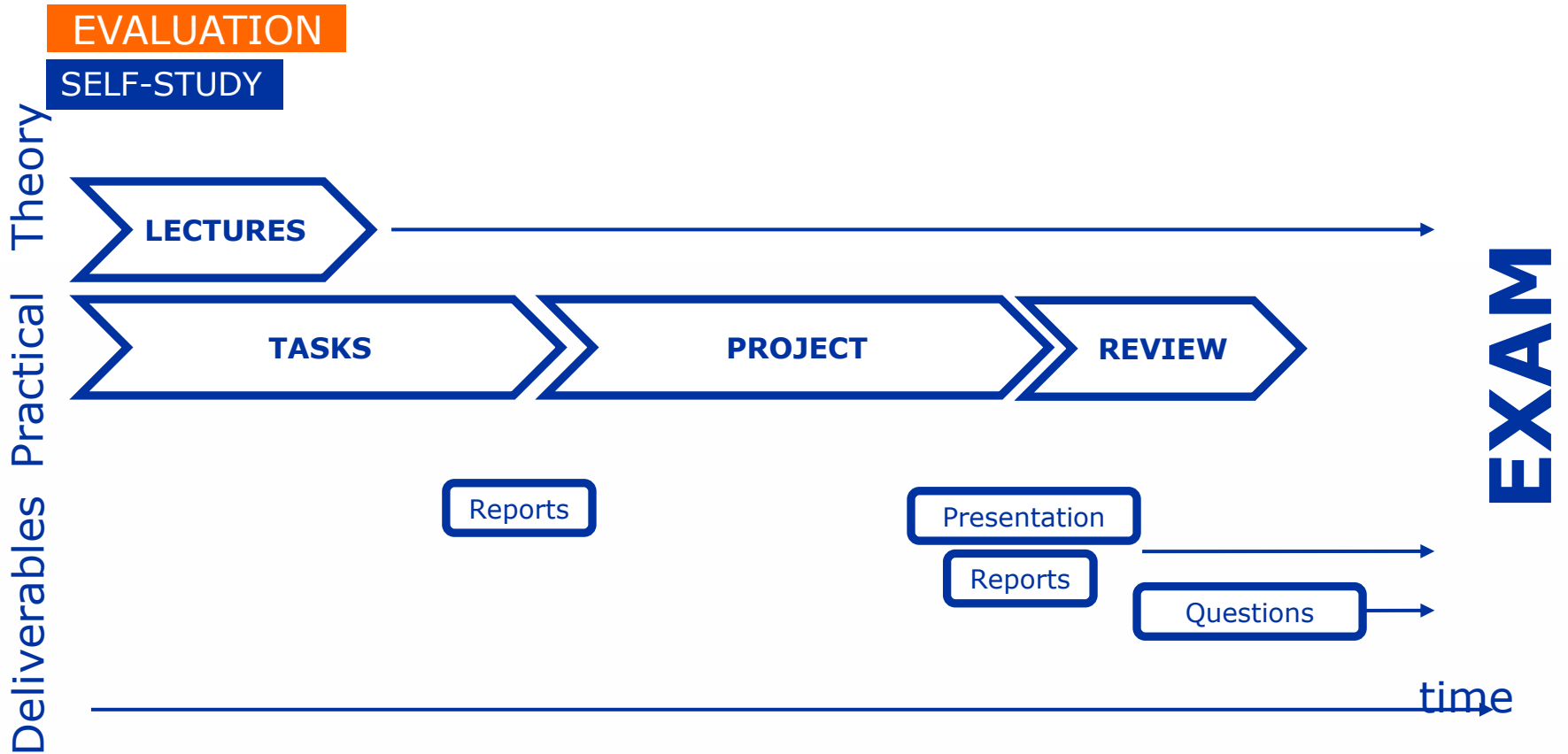# OPERATING SYSTEMS

PROJECTS PROPOSALS: WHAT TO DELIVER

EXPLORE VULNERABILITIES OF VIRTUALIZATION

EXAMPLE

Description: Explore security threads of virtualization

- Identify the type of attacks and defenses
- Perform some attacks to exemplify these threads

Objectives:

- Identify limitations and look for solutions when needed

References:

- https://blogs.getcertifiedgetahead.com/virtualization-technologies-weaknesses/
- https://dl.acm.org/doi/fullHtml/10.1145/3382190
- https://www.cse.wustl.edu/~jain/cse571-09/ftp/vmsec/
- https://en.wikipedia.org/wiki/Virtual_machine_escape
- https://www.hitechnectar.com/blogs/hypervisor-vulnerabilities/
- https://en.wikipedia.org/wiki/Hyperjacking
- https://pentestlab.blog/tag/virtualization/

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EVALUATION OF SCHEDULING ALGORITHMS

EXAMPLE

Description: Evaluate different scheduling algorithms for existing datasets

- Explain, implement and evaluate scheduling algorithms for particular workloads

Objectives:

- Evaluate at least 3 scheduling algorithms for different datasets

References:
- https://ieee-dataport.org/documents/dataset-meta-heuristics-scheduling-algorithm
- http://www.schedulingbenchmarks.org/
- https://ptal.github.io/scheduling-data.html
- https://optimizizer.com/jobshop.php
- https://github.com/tamy0612/JSPLIB
- https://www.sciencedirect.com/science/article/pii/S2352340920309604
- https://www.mdpi.com/2076-3417/10/15/5134
- https://arxiv.org/pdf/1810.01963.pdf

Multi-Team project allowed!

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MANY MORE POSSIBLE TOPICS
PROPOSE YOUR OWN

- Security in Kubernetes

- Performance analysis of virtualization
  - Type of VMs…
  - WINE performance degradation
  - QEMU….

- Applied machine learning
  - Scheduling
  - Real-time systems
  - ….

- Propose yours!

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Description:

- Brief description of the project, goals and expected results

Objectives: Tests to be performed. Expected results.

- 1) And 2) must be implemented and compared in terms of security!
- Evaluate what type of attacks can be performed on each solution.

References:

- Always include your references

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DELIVERY
PROJECT

- Project presentation (10 to 15 min)

  - Structure:
    1. Introduction/Background: Basic concepts, terminology, important parameters,….
    2. In-Deep Description: Characteristics, Features, …
    3. Evaluation: Experiments, benchmarks, Analysis,….
    4. **Discussion and Conclusion**

- Slides (.pptx or latex format)

- Report (Up to 15 pages + references)

  - Structure:
    1. Introduction
    2. Background
    3. Description
    4. Experimental Results
    5. **Discussion and Conclusion**

Note: Include ALL the references you have used!

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DELIVERY (II)

REGARDING OTHER PROJECTS

- Abstract (~250 words)

    - Structure:
        1. Description
        2. Results
        3. Discussion and Conclusion

- Three Meaningful Questions

Optional (up to 1 extra point)

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USEFUL LINKS

BENCHMARKS PERFORMANCE

- OS
  - https://www.bitsnbites.eu/benchmarking-os-primitives/
  - https://www.eembc.org/coremark/
  - …

- QEMU
  - https://openbenchmarking.org/s/QEMU
  - https://github.com/astralcosmonaut/qemukvm-benchmark
  - https://www.diva-portal.org/smash/get/diva2:1058030/FULLTEXT01.pdf

- Android
  - https://www.apkmirror.com/apk/ul-llc/pcmark-for-android-benchmark/
  - https://antutu-benchmark.en.uptodown.com/android

- Literature:
  - Check Open Source Benchmarks: https://en.wikipedia.org/wiki/Benchmark_(computing)
  - https://www.cs.oberlin.edu/~kuperman/research/papers/audlib2007mcurcsm.pdf
  - https://homepages.cwi.nl/~steven/dry.c
  - …

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USEFUL LINKS

BENCHMARKS REAL TIME

- https://amdls.dorsal.polymtl.ca/system/files/RTOS%20%20Benchmarking.pdf
- https://github.com/gchamp20/RTOSBench
- https://github.com/mbitsnbites/osbench
- https://github.com/huaweikang/realTimeTest
- https://github.com/yuchen9760/ParMiBench
- https://github.com/embecosm/mibench
- …

- Literature

  - http://wiki.paparazziuav.org/w/images/2/22/PaparazziBenchmark11_paper.pdf
  - https://github.com/t-crest/patmos-benchmarks/tree/master/PapaBench-0.4

  And Many more!

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USEFUL LINKS

BENCHMARKS SECURITY

- https://cve.mitre.org/
- https://github.com/awslabs/aws-security-benchmark
- https://github.com/ossf-cve-benchmark/ossf-cve-benchmark
- https://openssf.org/blog/2020/12/09/introducing-the-openssf-cve-benchmark/
- https://www.cisecurity.org/cis-benchmarks/
- https://owasp.org/www-project-benchmark/

And Many more!

- Exploit Database - Exploits for Penetration Testers, Researchers, and Ethical Hackers (exploit-db.com)