Project list

QEES 2020-2021 (in4390)

Introduction

To customize your learning track for the QEES course you can take on two kinds of projects:

1. Tool survey (≤ 80 pts)
2. Research task (≤ 120 pts)

Below we will discuss the requirements and possible topics for each, but we prefer if you come up with your own idea. As for the labs you will work in **teams of two**, and you will need to obtain approval from a TA to warrant feasibility of your proposal and avoid overlaps with other teams.

The coarse schedule for a project is as follows:

1. Propose/claim topic by **December 18**
2. Presentation on **January 14** (last lecture)
3. Documentation uploaded on Brightspace by **January 22**

Tool survey

The goal of a tool survey is to investigate one of the existing tools for modeling, evaluating, verifying, measuring, or analyzing a non-functional property of a system. Your survey has two items:

1. A report (of up to 5 pages) that describes the tool (what does it do, what type of evaluations can be done with the tool, what are its limitations, etc.).
2. A demo example on which you explain the tool's features/inputs/outputs.
3. A live presentation in class so that your fellow students learn from your experience and learn about the tool. This presentation is short (about 10 minutes).

Suggested topics (but feel free to pick one yourself):

- UPPAAL (formal model-checking tool)
- PRISM (probabilistic model-checking tool)
- Gem5 (cycle-accurate hardware simulator)
- QEMU (emulator and visualizer)
- CPN Tools (colored petri-net)

Deliverables (to be uploaded on Brightspace):

1. A 5-page report (in PDF)
2. A 10-min presentation (powerpoint, PDF) including a demo
3. The software (code, tool input) to run the demo, and a step-by-step guide on how to it

Research task

The goal of a project is to apply the knowledge you gain through this course to evaluate an embedded system. You are free to choose the evaluation method (e.g., you can use analytical modeling using Petri-nets, Markov models, etc., or use measurement-based techniques). In principle you could evaluate any kind of system (application), but we suggest to keep it simple and limit yourself to studying a (middleware) component. For example, you could do a detailed performance evaluation of the overheads introduced by ROS 2.0 observed in Lab 1 (or any other communication protocol). Please use an open-source system such that you can look at (and instrument) the code in detail.

You must propose a project detailing the objective (what do you want to model/measure), specific approach, and expected results. In particular think about:

- **Research questions**: questions that you want to answer through the evaluation
- **Metrics**: what metrics do you want to use to answer the questions
- **Workload**: what type of workload do you want to consider
- **Evaluation**: how do you want to design your experiment and evaluate those metrics

Deliverables (to be uploaded on Brightspace):

1. A report (in PDF), 5-8 pages
2. A 10-min presentation (powerpoint, PDF) to be delivered in class
3. Extra materials that support your evaluation