Discrete Event Systems

Introduction

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Discrete Event Systems
Discrete Event Systems

Why should you care?
Being based on natural phenomena, Science is often explained by continuous variables.
Being based on natural phenomena, Science is often explained by continuous variables solved by differential equations.

\[ F = G \frac{m_1 m_2}{r^2} \]
Many complex systems are not continuous...
Somewhere inside Google datacenters
amazon.com home page

Software systems
Those systems are determined by discrete events.

Customers requests

Telephone calls

Train arrivals

Incoming data

Equipment failures

…
In this course, you’ll learn how to

Model
Analyze
Design Discrete Event Systems
Test
Optimize
<table>
<thead>
<tr>
<th>Process</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>automata &amp; petri nets</td>
</tr>
<tr>
<td>Analyze</td>
<td>average-, worst-case viewpoint</td>
</tr>
<tr>
<td>Design</td>
<td>out of a specification</td>
</tr>
<tr>
<td>Test</td>
<td>proof system properties</td>
</tr>
<tr>
<td>Optimize</td>
<td>minimize the system size</td>
</tr>
</tbody>
</table>

some examples
There will be 3 lecturers in the course

Part I
Laurent Vanbeever
Automata

Part II
Roger Wattenhofer
Stochastic process

Part III
Lana Josipović
Specification model
Week 1-5
Laurent Vanbever
Automata

Week 6-10
Roger Wattenhofer
Stochastic process

Week 11-14
Lana Josipović
Specification model
Course organization

Lectures
Thursday 2pm–4pm
@HG D 7.2

Exercises
Thursday 4pm–6pm
@HG D 7.2

Materials
https://disco.ethz.ch/courses/des/